PACKAGE engineering

Stepped-up mechanization of cracker packaging

Careful attention to operating details and the specific solution of problems affecting high speed machine operation go hand in hand with equipment installation and layout to provide top mechanization. (See Page 9)

New ways of packaging delicate equipment

Replacing the traditional method of using heavy materials and concealing the product, a new idea is to use light-weight packaging — to win the respect of handlers by exposing the equipment's fragility. (See Page 18)

Installing and using a new packaging line

Engineers, operating men and plant management pool their talent and opinions to develop, de-bug and run a new packaging line to form, fill, close, label and pack cylindrical salt cans. (See Page 24)

Complete table of contents on page 2

APRIL 1956

VOLUME 1 • NUMBER 4

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PACKAGE engineering

AN ANGUS J. RAY PUBLICATION

Coming next month

Reviewing the special problems of barriers and packaging materials for candies, Dr. J. G. Woodroof, chairman of the food processing section, Georgia Experiment Station, Experiment, Georgia, discusses the cumulative experience of ten years of research on this topic. His thorough study reveals the delicate nature of candy compounding, with special reference to the adequacy of packaging to protect it, and reviews the usage and effect of numerous packaging materials.

When a search for a packaging engineer disclosed a wide gap between the salary a company could pay and the amount necessary to get a qualified man, Edmund H. Eitel, a management and personnel consultant, Halifax, Virginia, and his client worked out an unusual solution. In an article on this topic, Mr. Eitel tells how the promotion of a young engineer and the intermittent use of an outside consultant gave this company a solution to its problem — at a price it could pay.

Another forthcoming article discusses an effective way of making a package change within a company. When Bell & Howell Company, Chicago, undertook to reduce the cost of packaging a particular camera, it soon found out how to make a package change for an entire line. By making one person responsible for coordinating all details of the project and letting him clarify details between different departments, this company consummated its project with minimum effort.

— R. B. H.

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A step-by-step analysis of the evolution and operation of a soda cracker packaging line that uses maximum mechanization, coupled with the skill of personnel — the solving of specific problems encountered.

14 **Special problems of packaging certified reagents and laboratory chemicals**
Fisher Scientific Company's chemical division produces and packages 4,000 items, thus creating such difficulties as numerous short runs, thorough machine clean-up, and maximum packaging crew flexibility.

18 **Packaging of delicate equipment,** by Robert D. Courtright, project engineer, industrial engineering department, International Business Machines Corporation
Introducing not only a new concept of exposed packaging of fragile items (to win respect for their fragility) but also presenting some unusually complete engineering data, including package specifications.

24 **Engineering a new packaging line for Diamond Crystal Salt Company,** by R. Bruce Holmgren, editor, Package Engineering
Developing a new packaging line (including a package fabrication set-up) involves the combined teamwork of plant management, the engineers and operating men, and the crews on the line.

30 **If you can smell the product, it is probably under-packaged,** by Laurence V. Burton, consulting editor, Package Engineering
In discussing an unsatisfactory package for a good food product, Dr. Burton reviews some of the packaging factors involved in problems of flavor loss and shelf-life reduction — and suggests some solutions of these difficulties.

33 **American Management Association holds 25th anniversary National Packaging Exposition and Conference**
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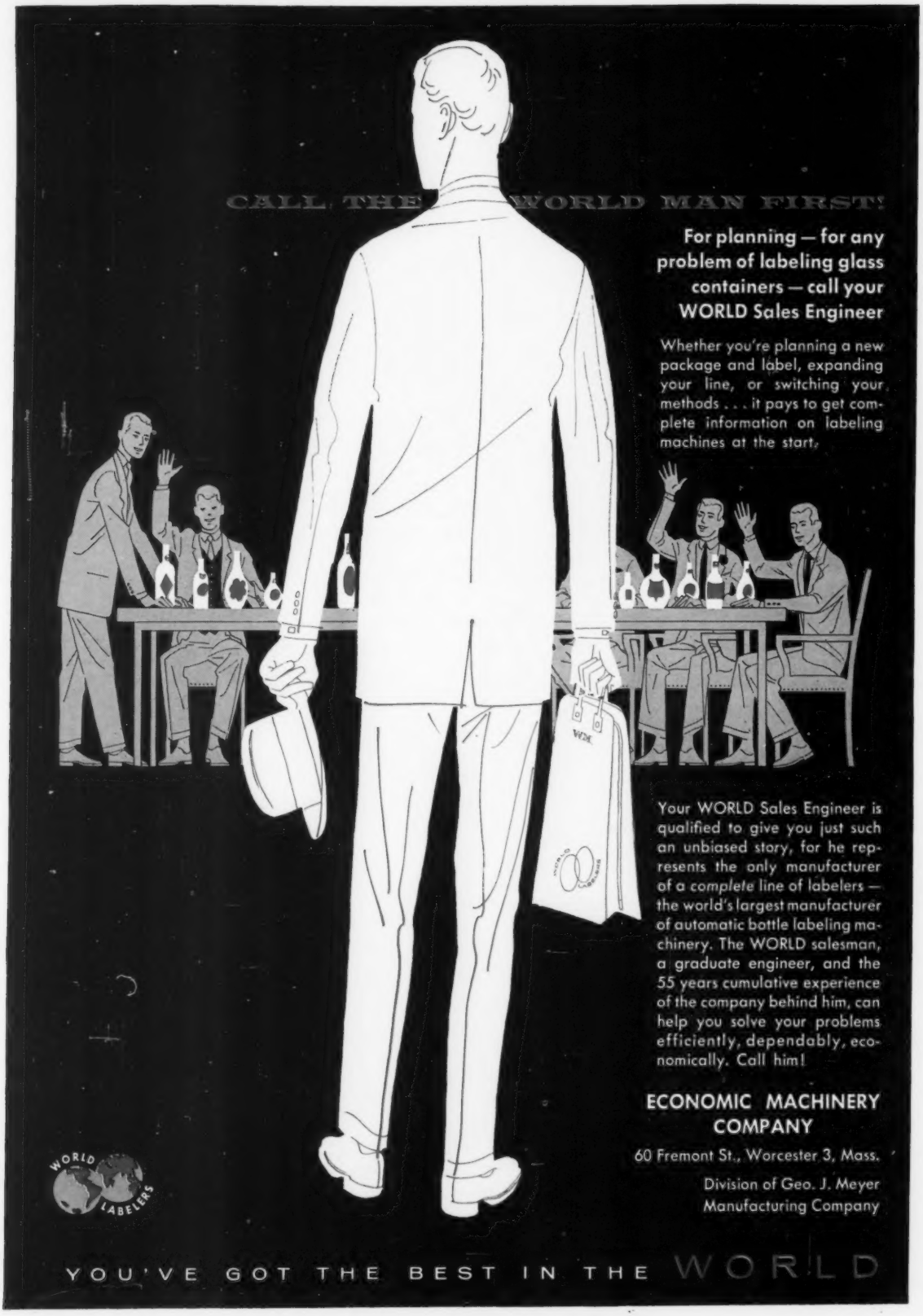
46 **Michigan State equipment drive still needs boost from industry**
MSU's current drive for badly-needed packaging laboratory equipment has netted $26,225 but the school must look to industry for another $14,990 — to give the ever-growing body of packaging students the lab facilities they need.

48 **What we think (our editorial page)**

Reader service card inside front cover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A note from the Publisher

The first packaging show I attended was held 13 years ago in the Hotel Astor in New York City. If memory serves me correctly, the registration for that show was about 6,000, and I don't believe more than 50 or 60 companies were exhibiting. The ensuing years have seen the packaging industry go through its greatest period of technological development.

Prior to the war the miracle of packaging was the great sales success scored by products, due solely to the fact that they were packaged. Product spoilage due to faulty packaging and damage in shipment were considered a cost of doing business. Today, the miracle of packaging is the amazing degree of mechanization possible in the packaging operation, and the almost limitless properties that can be built into a package by the correct selection of packaging material.

Scientific packaging really came into being when the military demanded that the traditional spoilage allowances be eliminated in all military shipments, and that 100 per cent of the war materiel packaged arrive at its destination in perfect condition and ready to use. Many of the packaging techniques and packaging terms that are in common use now were developed during the war period.

The last ten years have been a decade of tremendous technical development. Literally hundreds of new packaging materials have been developed during these years, and machine speeds have been stepped up again and again.

The American Management Association National Packaging Exposition, holding its 25th exposition in Atlantic City this month, reflects this growth. It is so large now that only a few cities in the United States can accommodate the 30,000 people expected to visit it, or have exhibition space large enough to house the contracted 130,000 square feet of exhibit space.

If you are attending the National Packaging Exposition for the first time, a few words about it might be of interest. At the time of this writing nearly 400 companies will exhibit, and they are showing everything from heavy machinery to fancy box decorations.

On page 34 of this issue is a listing of the exhibitors, the hours the show will be open, and the subjects to be discussed at the packaging conferences held in connection with the show. The conferences will be held during the mornings to avoid conflicting with the show.

For your convenience, we have bound into this issue two pre-registration tickets to the exposition. These tickets will facilitate and accelerate your registration at the show, and will also serve as your exposition badge. If you have your secretary fill out one before leaving for the show, you will avoid the time-consuming registration line when at the exposition hall. Registration for the exhibits is free. There is a charge of $20.00 to attend the conference sessions — or $15.00 if your company belongs to the American Management Association.

Angus J. Ray
Publisher

PACKAGE engineering

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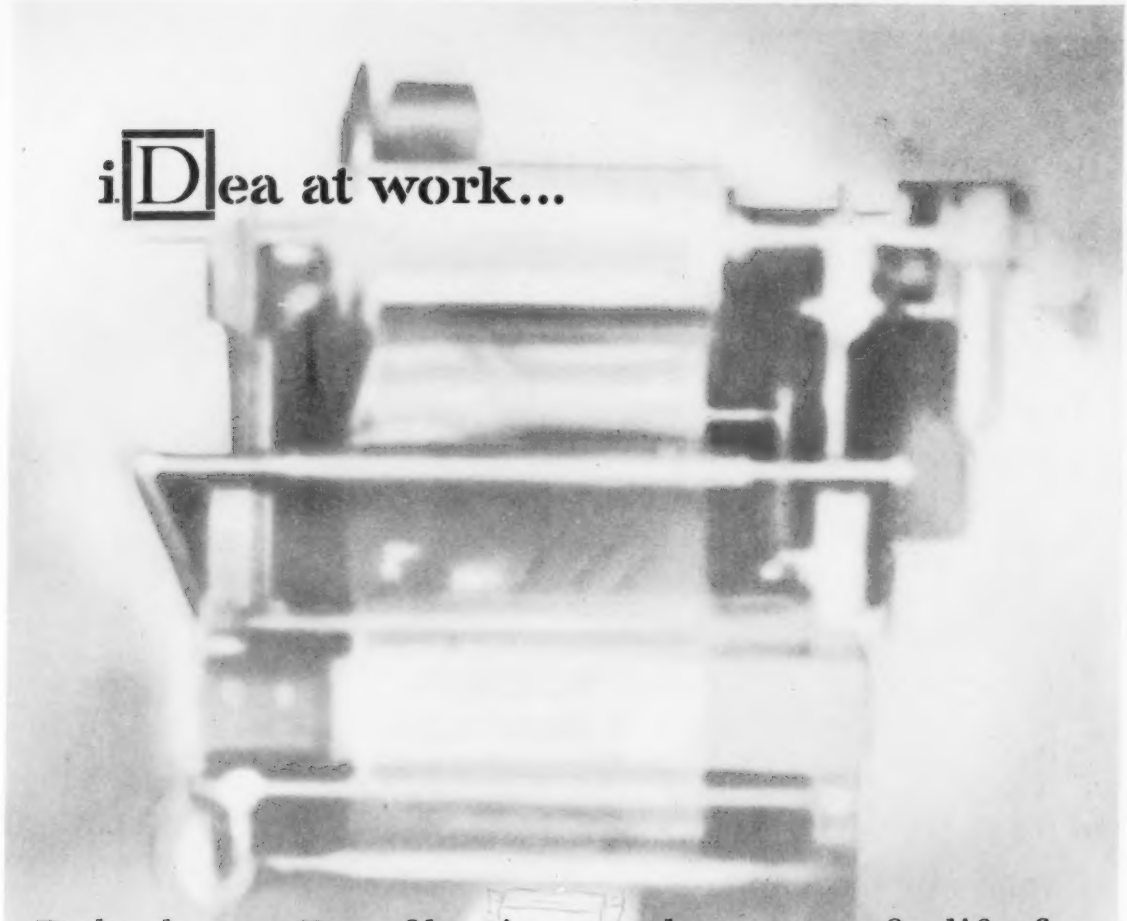

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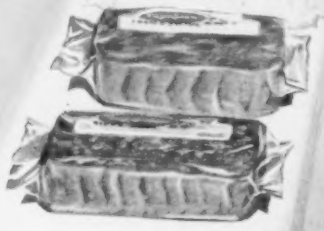

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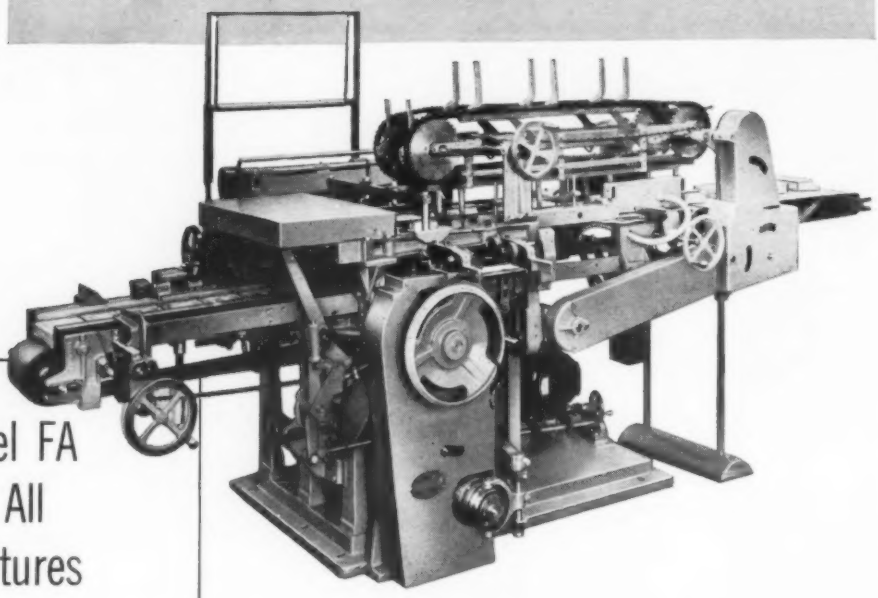

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John H. Heise is a graduate of the University of Wisconsin and joined the Robert A Johnston Company in 1941. His initial work was concerned with research and development of chocolate and chocolate products in the chocolate section of the laboratory. After service in the U.S. Navy during World War II, he was made senior chemist in charge of the biscuit section of the laboratory. In 1955 he assumed his present position. Mr. Heise is a member of the Institute of Food Technologists, The American Society for Quality Control, and is currently chairman of the research committee of the Biscuit Production Club, Independent Biscuit Manufacturers' Co., Inc.

Factors contributing to packaging line mechanization

by John H. Heise,
Superintendent, Biscuit Division, Robert A. Johnston Company, Milwaukee

Those wishing to know what it takes to mechanize a packaging line will find a wealth of practical experience and worthwhile opinions in this article. Reviewing his company's experience in developing its soda cracker packaging operation, Mr. Heise not only reviews the intimate operational details but also discusses the solution of a series of specific problems.

In this modern age of mechanization, automation and high sanitary practices, it seems hardly believable that not too many years ago crackers actually were packed in barrels. The Robert A. Johnston Company, manufacturer of chocolate and candy as well as biscuits and crackers, being over one hundred years old, has experienced many different evolutions in the packaging of food products, including the cracker barrel days.

The general trend of packaging over the years has been in the direction of providing the consumer with merchandise in an attractive package that adequately protects its contents. At the same time, the packaging must be done in the most sanitary and efficient manner possible. When it was decided to undertake an extensive modernization program in the biscuit division at Johnston's, these last two factors were kept in mind.

One measure of efficiency is the amount of labor required to produce a product. Prior to the modernization program a total of 30 people were required to package the approximately 22,000 pounds of crackers produced in an eight-hour day. At the present time, only half that number package 20,000 pounds of crackers produced in the same length of time.

How come less crackers now? *One* 200-foot band oven is producing nearly as much as *two* reel ovens did before, and with fewer people, too. This article shows where and how the savings in labor were made in packaging one-pound cartons of soda crackers.

Start: Packing Table

For packaging purposes the story begins at the packing table. This is actually a conveyor belt moving at approximately eight feet per minute. When the crackers reach this point, they are already broken into squares of four crackers each, by means of rollers and a series of wheels—just before crackers reach the packing table.

Use of these devices resulted in the first savings in labor, since prior to the modernization two people were required for stacking the crackers, while the packers themselves broke them into squares of four. This cut down on their packing efficiency, which is shown by the fact that five packers now do the work that required eight previously. Labor savings so far: Five people.

The packers are probably the heart of the whole packaging operation, since, with a deft touch and using both hands simultaneously, they select just the right number of sheets from the stacked crackers to weigh one-quarter pound, the basic unit of the

packaging operation. Standing on either side of the packing table (two on one side, three on the other) the packers place the crackers on conveyors suspended over the center of the table.

These conveyors discharge the crackers into each of four Model 43 Battle Creek wrappers, where they are wrapped in cellophane, forming the familiar one-quarter pound unit. Each wrapping machine is attended by an operator. A fifth machine is maintained in a "stand-by" condition for use in the event of a break-down on one of the other four. If this happens, the packers and operator of the machine in question merely move down to the stand-by machine and its conveyor, thus maintaining production without interruption.

Ready For Cartoning

Leaving these wrappers, the quarter-pound units are discharged onto a belt conveyor for transport to the R.A. Jones carton forming and filling machine. Since it is required that the feed into this machine be orderly, the output from each wrapper is maintained in a file on the conveyor by means of longitudinal guide bars.

The conveyor being wide enough for only four rows of quarter-pound packages, the desired input to the cartoning machine posed a problem with the fifth or stand-by wrapper. The problem was solved by providing this wrapper with a movable discharge that can be directed at will to any of the four lanes of the conveyor. Thus it is able to fill in for any wrapper that may be down.

The four rows of quarter-pound packages are discharged into the first transfer of the cartoning machine. By means of this device the four rows of packages are consolidated into two rows, and the direction of travel is changed 90 degrees, as follows: Prior to entering the transfer, the quarter-pound units pass under a series of fingers attached to micro-switches.

These switches insure proper belt loading of packages against cam-operated fingers which interrupt the flow of packages from each row into the transfer, by controlling the fingers. Belt speed and cam timing are such that when the finger in any row is raised, two quarter-pounds are released into the transfer.

Since the release finger for each row is controlled independently as regards belt loading, while the raising of all four fingers is accomplished off the same cam action, a situation exists whereby two quarter-pounds from each or any combination of the four rows are released simultaneously into the transfer. These packages are stopped against a barrier. A paddle, moving in a direction across the motion of the conveyor, pushes the packages onto a transverse conveyor. The sorting into two rows and the change of direction thus has been accomplished.

Details Of Transfer

The transverse conveyor discharges into the second transfer. Before entering this part of the machine, however, the quarter-pound units pass under two more sets of fingers and micro-switches. The first set of switches controls the action of the first transfer, allowing it to operate when the transverse conveyor is empty, but stopping operation when it is loaded.

The second set controls the operation of the carton forming and filling machine, stopping it when there are insufficient packages on the transverse conveyor, and allowing it to run when the transverse conveyor is properly loaded.

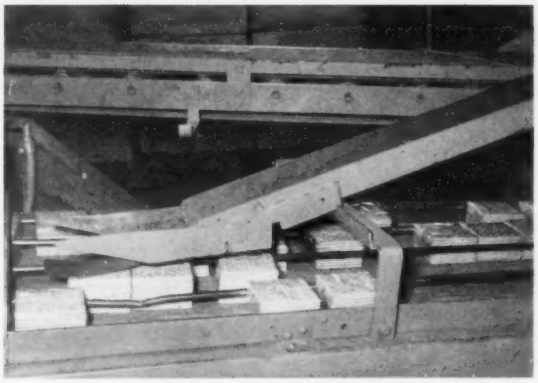
In the second transfer, the quarter-pound units of crackers are re-formed into four rows, and their direction of travel changes again—to parallel their original motion. This is accomplished by a gate which allows four pairs of quarter-pound units from the transverse conveyor to enter the transfer. A paddle similar to the one in the first transfer then sweeps the packages off the conveyor and into the final stage of assembly.

The question may be raised as to the necessity for the two transfers and the accompanying changes in direction, since the process begins and ends with four rows of quarter-pound units traveling in the same direction. Actually, there would be no need for all of this forming and

At this cracker breaker a set of wheels breaks the shingle-stacked crackers into sheets of four crackers each. Prior to the present installation of equipment as part of the packaging modernization program the breaking of crackers and their stacking were manual operations.

Input conveyor serving the No. 1 unit of the battery of wrapping machines is in foreground. Take-away conveyor from wrapper No. 2 is in background — and is loaded with quarter-pound units. Mirrors suspended above machinery let personnel scrutinize operations at discharge points.

Suspended over the packing table are the packing conveyors. These lead to the wrapping machinery. The packers, seen here, represent the heart of the packaging operation because their skilled hands take just the right number of crackers for each quarter-pound and put them on conveyor leading to next operation.



This movable discharge serves to connect the stand-by wrapper with any of the four principal conveyor lanes. Purpose of maintaining wrapper No. 5 is to have it as a substitute in case any of the four regularly used wrappers are down. By using it, the flow of wrapped items to the cartoner is not interrupted.

re-forming of rows if the flow of quarter-pound units were constant from each wrapper. But such is not the case.

There are inevitably short interruptions caused by broken packages, slight machine jams, replacing rolls of cellophane, etc. Since the automatic carton filling machine requires that four quarter-pound units be placed in a row, so that it may properly fill a one-pound box, the transfers take the production of quarter-pound units coming off the line, whether it be from one, two, three or all four wrappers. Then, they assemble it properly for the cartoning machine's use. The changes in direction of flow are necessitated by the method used for assembling the production.

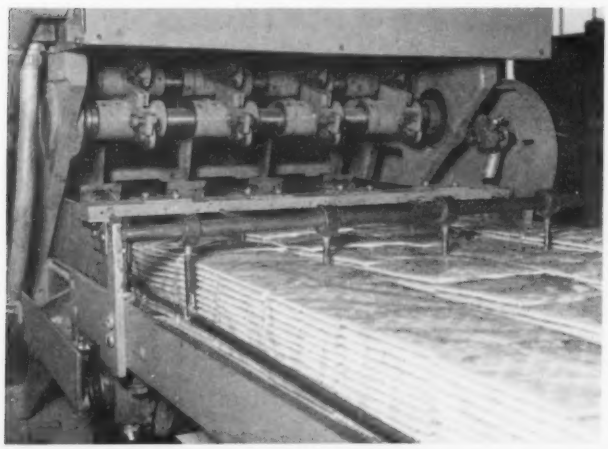
Assembling Of Units

As the quarter-pound units emerge from the second transfer, they are tipped from their bottoms to the side by means of a baffle in each row. This is to allow the use of a box that is square in cross-section, rather than one that would otherwise, of necessity, be rectangular in all dimensions. Traveling through the machine the rows of units are stopped by a small, raised platform.

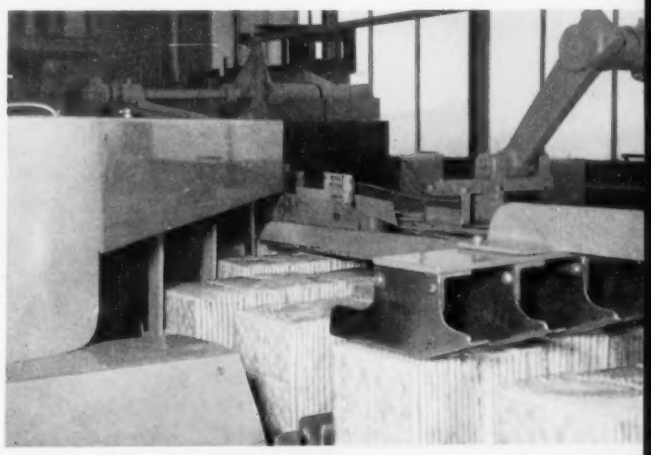
At this point, a cam-type elevator raises one unit from each of the four rows to the level of the platform, where a paddle sweeps the four units onto the final packing conveyor. The four quarter-pound units of crackers that will make up a one-pound box have finally been assembled. Formerly, two people were required to do this assembling. Total labor savings so far: Seven people.

Between the assembly point and the cartoning operation an inspector is stationed to make sure that no defective quarter-pound units get into the one-pound boxes. In this area also is located the magazine feed for

Entrance to first transfer shows four rows of quarter-pound units, and release fingers that control entry of units into transfer. Note that first three fingers are in raised position, while the fourth finger is down. This demonstrates the independent action of this equipment at this point of transfer.



Paddles push these rows of quarter-pound units into the cartoner, at the entrance to this unit. One of a set of sensing fingers, a series of which operates in connection with micro-switches to insure proper loading, is seen at right foreground. Micro-switches insure proper loading, with cam-operated fingers.



the one-pound carton blanks as well as the control station for the machine operator.

Beginning at the magazine feed, two conveyors run in parallel. One carries the empty cartons. These cartons, made of 0.018" white patent coated news, are supplied in the form of a square tube which has been flattened. Immediately after leaving the magazine, the tubes are automatically opened and the end flaps spread. Two operators were required to make cartons previously, but these are canceled by the cartoning machine operator and the inspector — no gain in labor saving.

The row of quarter-pound units and the carton into which they are to be packed approach the packing station aligned with each other. Sensing fingers are incorporated in the machine, so that in the event that either carton or crackers are missing, the machine stops until the deficiency is rectified.

Units Go Into Cartons

The actual cartoning operation is quite simple. At this point a series of paddles, suspended from a chain and timed to the spacing of the rows of quarter-pound units on the packing conveyor, push the row of quarter-pounds from the packing conveyor into the waiting carton. Four people were saved at this step. Total personnel savings so far here: Eleven.

Glue is then applied by rollers to the open end flaps, which are automatically closed by means of star wheels and guides. Two more people are saved in this operation. Another two are saved by using a varnished, printed carton instead of a waxed paper over-wrap. Total labor savings effected: 15 people.

The filled, glued and closed carton then travels through a compression unit to allow the glue to dry. The cartons are assembled into units of six, and are bundled in kraft paper by hand. As in the former operation, four people are so employed. Code dates and other data are printed on the gummed paper used for sealing the bundles by the tape dispenser.

Code dates are printed on the one-pound cartons while they pass through the compression unit mentioned above. The finished bundles are conveyed to the shipping room via power conveyors, roller conveyors and a spiral chute (actually one of three chutes wrapped around a common support) which drops them down three floors without damage.

As the bundles leave the production floor, they are counted by means of an electric counter, the indicator of which is located near the supervisor's desk so that at any time during the day he can, at a glance, see the total amount of production.

Solving Some Problems

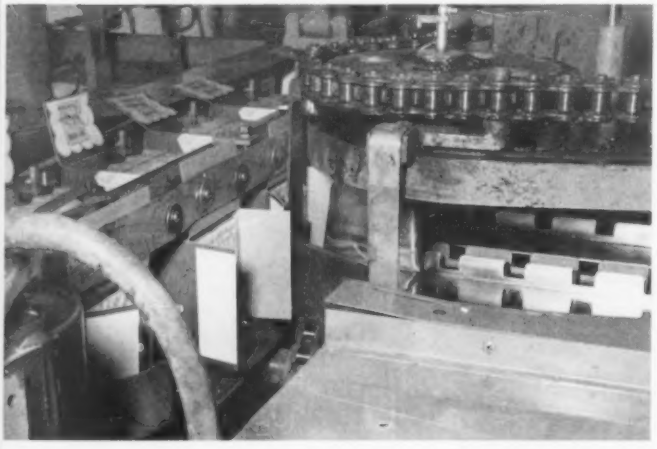
No description of the cracker packing line would be complete without reviewing some of the difficulties associated with it. One sensitive point is the set of fingers regulating the entrance of quarter-pound units into the first transfer. It is not necessary for the units to be alike in all dimensions to the millimeter, but the greater the uniformity, the better the operation.

The use of so many guides and slides poses a problem in friction, since rubbing against the guides tends to twist the packages out of alignment, sometimes sufficiently to jam the operation. The use of a silicone spray applied to slides and guides has helped minimize this problem.

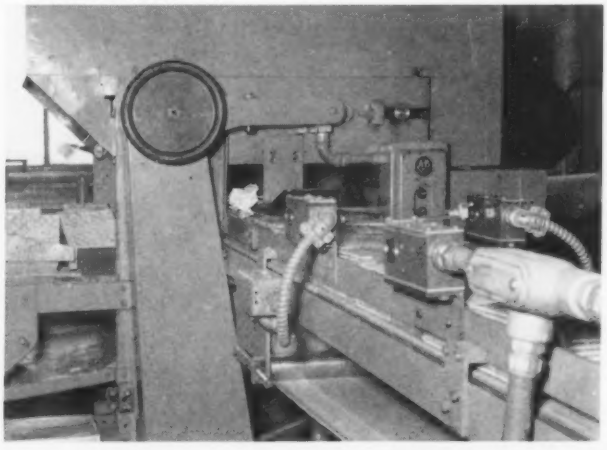
Another factor that can cause considerable, and sometimes rather mystifying, difficulty lies in the multitude of micro-switches employed in the transfers and the cartoning machine itself. If one of these switches gets out of adjustment, considerable time can be spent in tracing down the culprit. It is, therefore, advisable to have a good preventive maintenance program on the machine.

All will agree that the best operation of any machine is obtained with long, continuous runs of one single product. Most are afflicted with short

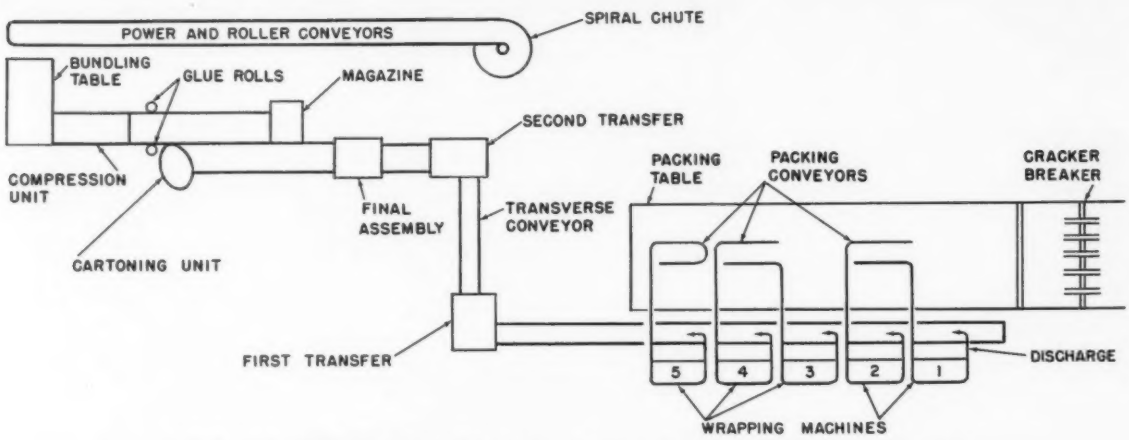
Exit from cartoning unit shows that one paddle has just finished filling a carton. Guard has been removed to show machine operation. Packages are proceeding toward glue roll in left foreground, as some flaps are being closed and others are being adjusted for gluing operation in this automatic operation.



This is the entrance to the second transfer of the cartoning operation. Micro-switches are located on the transverse conveyor. At left, the quarter-pound units are being tipped on their sides at the discharge. A gate allows four pairs of quarter-pound units from the transverse conveyor to enter the transfer.



JOHNSTON'S CRACKER PACKAGING LINE



Here is the working relationship of the equipment components of Johnston's mechanized soda cracker packaging line. Flow of production starts at far right, where soda crackers go through breaker — which delivers stacked, four-cracker units to packaging line. Expert packers transfer them to conveyors leading to wrappers. From this stage, they go through automatic cartoning operation, ending as completed one-pound packages, each containing four quarter-pound wrapped units. At bundling table at far left they are made into six-carton bundles for transfer to shipping floor.

runs (one shift or less) of a variety of products. The present operation is not adapted to rapid change-over, since it takes one man two hours to make the desired change on the wrappers, and three more men one hour to change the cartoning machine.

So far, the only solution has been to schedule production so that changes can be made between shifts or during production of some item, such as oyster crackers, that is not packaged on the equipment described.

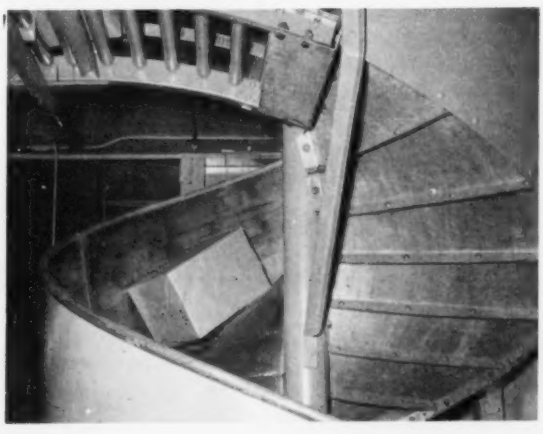
Do It With Mirrors

One more item that may be of interest concerns the use of mirrors at the wrappers. Standing at her normal operating position at the feed end of the wrapper, the operator cannot see the discharge end. A cocked or damaged package coming out of the machine could cause a jam and resultant loss of considerable merchandise if not given prompt attention. Consequently, mirrors were suspended over this point of the machines, enabling the operator to remain at her normal position and still keep a close watch over the discharge end.

All things considered, including the troubles mentioned above, the line has proved to be quite efficient, thanks to the work of the engineering and industrial engineering departments in designing the lay-out and also to the maintenance crew in keeping it running. It is now up to the production department to get the most out of it!

After filled and glued cartons leave the compression section of the cartoning unit they move to this bundling table. Here, four bundlers assemble cartons into units of six each and manually bundle them with kraft paper. Gummed paper used for sealing is printed with code dates and other data.

Completed bundles move to shipping room on this spiral chute. Leaving the production floor, bundles are counted. This chute is one of three chutes which are wrapped around the common support seen here. These chutes drop bundles three floors — with no damage to contents, since a retarding action occurs.



Special problems of packaging certified reagents and laboratory chemicals

When you have many short runs of a very diversified line of liquid and dry chemical products, you have to schedule work carefully, provide for adequate machine clean-up, and maintain a high degree of mannal flexibility. This is what Fisher Scientific Company has to do at its Fair Lawn plant, which produces 4,000 different items.

Faced with such packaging problems as short runs, many different items, and maintenance of chemical purity, Fisher Scientific Company has developed packaging lines and in-plant methods to solve these difficulties by means of (1) careful scheduling, (2) personnel flexibility, and (3) adequate change-over and clean-up procedures. Along with these go a container simplification program and a centralized in-plant label printing operation—to minimize what would otherwise be a staggering inventory problem.

The Fair Lawn, New Jersey, plant of Fisher's chemical division produces some 4,000 different items of laboratory chemicals and certified reagents. Items for which this plant acts as a distributor to Fisher shipping plants around the country brings the total catalog listings to some 7,300 items. Since most of these products are ordered in relatively small quantities, the heart of the packaging problem is the handling of short runs.

PACKAGING DEPARTMENTS. The dry products packaging department has a controlled temperature and humidity room in the Fair Lawn plant, but the liquid packaging operations require a separate building (with explosion-proof facilities) because of product flammability. One-third of Fisher products are liquid items. However, the packaging of dry items entails more planning and scheduling difficulties than the liquid items involve.

Focal point of the scheduling process is to plan runs according to bottle size: The capper can handle only one size at a time, so the crew tries to fill all of the different bottles involving the same cap at once—regardless of bottle size. Also, they plan runs in terms of the labeler, since a change-over of the capper and labeler entails about 25 minutes.

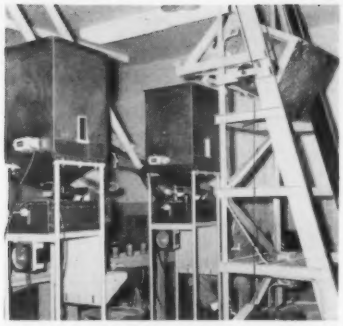
Careful Planning Vital

To coordinate the packaging operation in order to minimize loss of time for change-over and the like means that careful planning of runs is necessary. To avoid unduly tying up machinery, the plant usually limits machine packaging to runs involving a 100 or more units. Smaller quantity runs go through hand packaging operations. Key man for the run planning process is the foreman, in charge of the dry packaging and liquid packaging departments. He receives the individual job cards and arranges them into a schedule of runs for a given day.

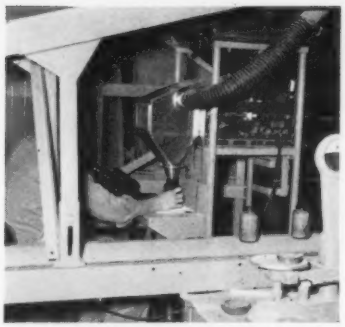
First, he seeks to group the runs involving similar container sizes. Thus, he plans the runs so that the crew works from size to size systematically. For example, they do all runs of products using a 4,000-cc. bottle. Then, come all the runs involving the next size, say, a 3,000-cc. bottle. As these runs take place, the capper and labeler are adjusted accordingly.

CLEANING FILLER. Proper cleaning of the filler from product to product is more of a problem than actual adjustment. There are two fillers (they clean one while running the other) equipped with electronic timing devices to control the predetermined fill of product by means of bucket-and-weight equipment. Crew members clean these fillers from run to run, taking out the hoppers and washing them with hot water.

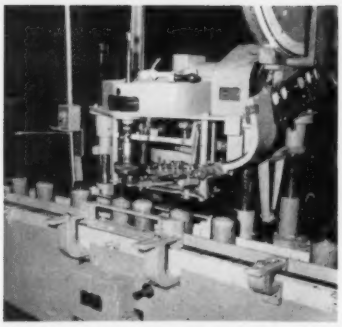
They also take filler buckets and other units apart, to be sure of adequate cleaning. Stainless steel is used throughout, wherever product touches metal—such as through the filling machinery. To supply each filler, there is a standard dumping device—which handles the metal or fibre drums in which the plant's manufac-



For dry packaging there are two filling machines, each equipped with electronic timing devices to control a predetermined fill. Careful hot water washing of parts between runs of different products is necessary in order to maintain chemical purity of products packaged on this line.



Use of many container sizes necessitates flexible crew practices and equipment usage, since Fisher packaging involves short runs as a rule. In planning filling runs, crew members work from one size to another, but the adjustment of labeler and capper govern, since filling machine has more flexibility than the latter.



Filled containers move to capping machine. Although filling and capping operations are subject to intricate scheduling of short runs, plant practice is to cap as soon as possible after filling. Not visible are units of vent system — which change room air and remove fumes and dusts. Room is air-conditioned.

turing department furnishes to the packaging room the material being filled.

Packaging Operations

Empty glassware now arrives at the plant in reshipper corrugated boxes. Formerly, the plant ordered boxes separately and set them up within the plant. Most of the glassware used is amber, in order to keep out light. Some products packaged are so caustic that they would attack the glass, so these items go into polyethylene bottles. Further, the plant makes some use of metal cans.

Once emptied from their reshippers, the containers move through the filling equipment, then go through a Resina capper which automatically puts a short-necked cap on each. In spite of the scheduling and planning difficulties, it is the plant practice to cap as soon as possible after filling.

COMPLETING PACKAGES. Next, each container goes through a New Jersey labeler which applies a thermoplastic label, after which the individual containers are put back into their reshippers and placed on skids pending transfer to shipment. For long runs (2500 units is a "production" run for this plant) there is a wall opening to facilitate transfer of completed goods—out of the packaging department.

Temperature is controlled at about 70 degrees F and the relative humidity is kept below 50 per cent. Maintaining this between 40 and 45 per cent seems best for the packaging operations handled in this department. An unusual feature of the operation is a minimum of odors in the packaging room—since there is a system of vents. These are located not only at packaging equipment but also at manual packing tables—to facilitate removal of fumes and dusts.

Some Special Problems

It is the practice of the plant to maintain complete flexibility of packaging room crew members. Because of the extremely diversified short runs it is necessary to train these people so that any person can handle any of the principal tasks of the packaging operation. Similarly, they have to be able to adjust to frequent changes—as when rush orders arrive, requiring priority over work previously scheduled.

The nature of the products being packaged create certain problems to which the packaging crews must be alert. For example, a fluffy material is difficult to fill by machine. The problem of bridging arises. Likewise, large crystals require hand filling because they cannot be filled by machine—due to crystals catching in machine buckets.

LABEL PRODUCTION. For these (and the other Fisher packaging operations) the plant operates a label department, using Davidson printing equipment. While stock labels are made up in advance, in sheets, the actual labels for a given run may be prepared on short notice. This is one of the reasons for having a label department—to furnish labels for rush orders without being dependent on an outside supplier.

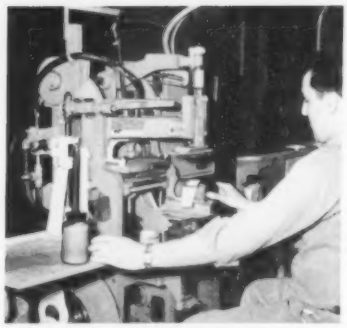
A special problem of labeling is that while labels for laboratory chemicals may be inventoried, labels for reagents require the *actual* analysis. Thus, the reagent items have to be analyzed before their labels may be printed. The certificate of analysis has a lot number for the analysis it represents.

RUNS ARE FLEXIBLE. Thus, the number of times a sheet of labels goes through the printing equipment depends on the product to be labeled. Although it is frequent that a label goes through three or four runs, there are no excess runs—since labels are specifically printed to order. These are all thermoplastic labels.

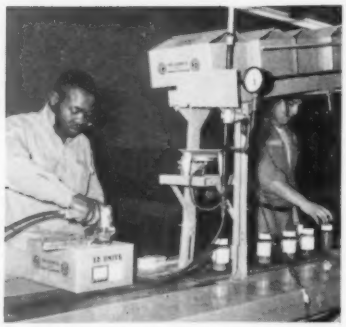
There is Potdevin hand heat sealing equipment available for labeling containers not run through the automatic labeler—thus making thermoplastic labels available to manually packaged items. Whether manual or automatic packaging is involved, all labels are printed prior to a run and are sent to the packaging department with the pertinent job cards.

Packaging Of Liquids

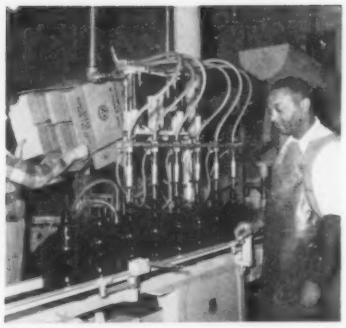
Because the runs are longer, scheduling of liquid packaging is not as complex a matter as with dry packaging. However, there is some scheduling to do and it is necessary to accumulate job cards, to group orders using similar containers—such as



Each container gets a thermoplastic label after leaving the capper. Man operating this labeler can also handle all other tasks on packaging line, since diversity of operation requires flexible crews. Plant has its own printing operation; fully printed labels accompany job orders.



Completing of packages involves putting closed containers (with cellulose bands in place) in reshipper corrugated boxes (on overhead conveyor), closing cases and discharging them at left. Conveyor carrying empty cases receives these cases from bottle and jar unloading point near filling machinery.



Liquid packaging department has two filling machines which utilize stainless steel wherever product contacts metal. Where flexibility is necessary there are polyethylene hoses. Man at left is dumping cases of container; he puts empties on powered conveyor which carries them through wall to loading point.

pints together, quarts together, etc. Also, there may be different grades of the same product. Further, tight control of products is maintained.

For example, products received in tank cars get a laboratory analysis prior to acceptance. Also, before a filling run starts there must be an analysis. An incidental feature of this analysis is that it verifies the adequacy of the clean-up of filling machinery between different runs. The analysis determines whether or not the material of the previous run has been absorbed.

SAFETY FEATURES. There are hoods and vents at all packaging equipment. An air change takes place three times a minute. Crew members must wear protective clothing and equipment for certain items. Safety tools are used throughout, and all equipment is grounded.

There is a centrifugal pump and a vacuum system to deliver product to the two filling machines. Both pump and piping are of stainless steel, which is used throughout except where the product goes through polyethylene hoses—where flexibility is needed. Either the pump or the vacuum may be used interchangeably, or at the same time.

Transfer Of Product

One problem required an external solution: When the pump failed to deliver the product properly, plant technicians raised the outside storage tanks four feet. This provided enough head for the pump to operate. Now, the pump easily delivers whatever product is needed at the filling machinery.

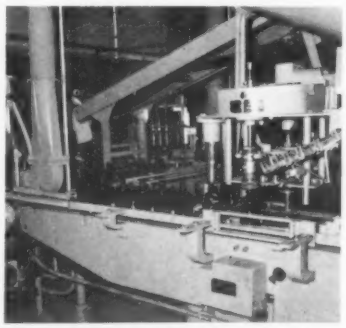
Practically no adjustment is involved with the vacuum, when the plant uses it. Products and pumping and transfer distances and elevation require merely a "typical" vacuum. Thus, by one means or the other, the product gets to the filling machine and goes into the containers involved. Leaving the filling machinery, containers (from either of the two fillers) move by conveyor to a Resina capper, then through a wall opening, to a New Jersey "Pony Express" labeler in the next room.

After being labeled, the containers are packed into cases for shipment. These are the reshippers in which the empty glassware arrived. Empty cases move by powered conveyor from the unloading points (at the filling machines) to the re-loading station.

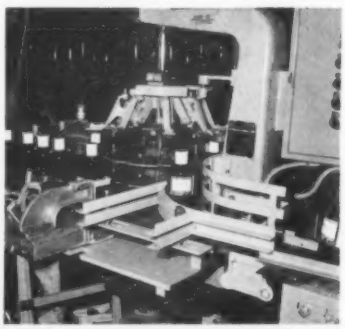
Container Diversification

A feature of the entire packaging operation, for both dry and liquid items, is the relatively small number of containers and closures which these 4,000-odd products use.

Ten different sizes of wide mouth amber bottles; six different fibre drum sizes; ten different caps, for both liquid and dry items; five different glass stopper bottles; eleven sizes of cellulose bands; three polyethylene bottles; three sizes of flammable liquid containers, and six bottles for flammable liquids.



One capper serves two filling machines by means of connecting conveyors. Just as with dry packaging operation there are hoods and vents to remove fumes. An air change takes place three times a minute. Extent of machine clean-up to insure chemical purity depends on laboratory analysis of product before actual run starts.



Outside filling room is the labeling operation and an area for the completing of packages, including case loading. Containers ready for labeling move on a conveyor through a wall opening to reach the labeler. Labels come from label printing department, just as for dry items. Labels for reagents require *actual*, not "typical" analysis.

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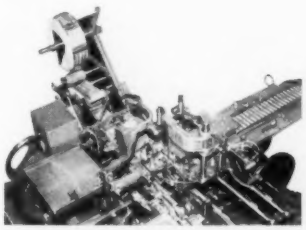

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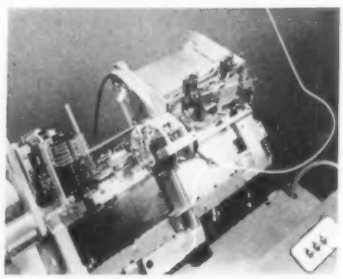
Robert D. Courtright graduated from Sibley School of Mechanical Engineering at Cornell University and joined IBM as a student engineer upon completion of his college work. His packaging assignments at IBM have included direction of a company-wide modernization of packaging techniques and the coordination of an air freight shipping program of IBM machines to the West Coast.
He recently participated in the design and layout of a new typewriter factory.
Mr. Courtright is a member of American Society of Mechanical Engineers and the Cornell Society of Engineers.

Packaging of delicate equipment

By Robert D. Courtright,
Project Engineer, Industrial Engineering Department,
International Business Machines Corporation,
Poughkeepsie, New York

Here is a new approach to the packaging of delicate equipment: Instead of concealing it within an extremely heavy package, you expose its delicate features—so that those handling it are moved to treat it with respect. This article not only tells how to carry out such a packaging project, but also presents some invaluable data on package specifications and requirements.



1. Commercial equipment of a delicate nature is a close tolerance assembly of intricate, rapidly-moving electro-mechanical devices.

2. A complete machine weighing 300 pounds mounted on its crate base with disassembled components in place. Work table is wrapped in flexible kraft paper at left, and keyboard with cable attached is at right. Note the use of cloth and industrial tape for holding them in place. The machine itself is held simply but firmly by holddown straps at diagonally opposite corners. No other bracing is required.

Prevalent thinking about packaging of delicate commercial equipment has involved in the past the use of solid wooden cases augmented by complicated internal bracing and shock mounts. All this rested on a widely-held belief that this type of container, being one of extreme strength and durability, could protect its contents against any possible shock encountered during shipment.

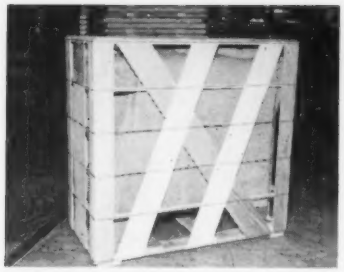
In recent years, however, this concept has been completely contradicted to a point where successful application of the exact opposite variety of package is now being used in a number of instances. This reversal can largely be attributed to the discovery that a *fragile-looking* package, designed for ease of handling, will be treated with considerably more respect by every person along its route than that accorded its bulky predecessor. This seemingly psychological approach has enabled several companies to reduce their packaging costs drastically, while continuing to supply their customers with a damage-free product.

For purposes of this discussion, delicate equipment is defined as "that type of commercial equipment which contains an assembly or assemblies of intricate, high-speed electro-mechanical devices or electronic components manufactured and matched to close tolerances." It does not include military products which usually involve government specifications.

An engineering project to revise the packaging of such a highly-engineered product, is complex, if all details are to be covered. In general, however, it breaks down into the following operational steps:

1. Information-Gathering Stage

This includes a complete analysis of the product and all the aspects of its present packaging. Exterior



3. The completed package. A water-resistant creped envelope has been dropped over the machine prior to closure of the container. This shipment can be handled easily and safely by the use of hand trucks, without involving damage.

4. The former container looked sturdy enough to take a lot of shock; consequently, it was usually given rough treatment. Its replacement with a light-weight container saved 30 per cent of the equipment shipping-weight and reduced damage by 50 per cent.

Typical Benefits Derived From Improved Packaging Methods

1. Manufacturing Costs Reduced:
   a. In-bound freight and in-bound handling costs reduced.
   b. In-process inventories reduced.
   c. Use of larger capacity equipment possible.
   d. Utilization of existing plant and equipment increased.
2. Distribution Costs Reduced:
   a. Shipping weights lowered.
   b. Unnecessary handling eliminated.
   c. Packaging and packing costs lowered.
   d. Shipping-damage claims reduced.
3. Customer Service Improved:
   a. Faster shipment of products.
   b. Reduced shipping damage.
   c. Fewer shipping and billing errors.
4. Personnel Relations Improved:
   a. Drudgery reduced or eliminated.
   b. Greater safety.

containers, interior auxiliary packages for disassembled components, location of hold-down points must all be covered. Inherent structural weaknesses in the product design must also be noted.

Concurrent with the finding of the foregoing facts, an investigation must take place regarding the methods of shipment commonly used by the company's traffic department, i.e., motor freight, rail freight (LCL or carload), and the possible warehousing of the package enroute. Existing freight classifications must be studied to determine whether modification is necessary.

Since a natural objective of the program is to bring about a cost reduction, the purchasing department should be asked to assist in finding vendors of available packaging materials, and to obtain firm price quotations for them.

Suggested ASTM Test Methods For Delicate Equipment Shipping Containers

D 642-47 Compression Tests
D 1372-55T Cushioning Materials for Packaging
D 880-50 Incline Impact Test
D 644-55 Moisture
D 1185-51T Pallets
D 1083-53 Shipping Cases and Crates
D 999-48T Vibration Test
E 96-53T Water Vapor Transmission of Materials in Sheet Form

Basic Steps In Organizing An Integrated Packaging Revision

1. Put a responsible executive in charge of the program.
2. Secure competent technical direction.
3. Consider all aspects of the problems to be studied.
4. Provide for active participation by line personnel.
5. Prepare a written working plan and provide for frequent checks.
6. Revise the plan to include installation steps when an action program has been developed.

2. Development Stage

By this time, the engineer assigned to the project must be fully acquainted with the product for which he is to design a package, and must also be familiar with alternate techniques suitable for the job.

Equally important, he must guard himself against fixed or preconceived opinions about packaging in his company, so that he can approach the task at hand with a completely open mind. Management has a definite obligation to allow him to continue in this fashion; otherwise, he can easily tumble in to the pitfall of precedent — and accomplish nothing.

This step in the program involves the actual design of the necessary package or packages. It includes the preparation of engineering sketches for all components and the procurement of samples to allow an actual fit of the package to the product.

This phase can be simplified by close liaison with potential suppliers of the packages being considered. Most large suppliers maintain their own engineering departments to design and construct samples for prospective customers. Qualified assistance of that nature cannot be disregarded.

Consideration must be given at this point to:

a. THE BEST METHOD OF SUSPENSION of the equipment in the package. The center of gravity should be located, at least approximately. The simplest hold-down is invariably the least expensive. Strong points in the machine should be used for attaching fastening devices and protective padding.

b. THE EASE OF CLOSURE at the packing point and of opening at the destination. This point can very likely make or break a particular design because of its effect upon using personnel.

c. HOW THE CONTAINER WILL BE HANDLED ENROUTE. A package light enough for handling by hand trucks must be designed for such handling; heavier packages must include a skid or pallet bottom to accommodate fork trucks or rollers.

It must be remembered here that **freight handling personnel will handle a flimsy-looking container more carefully than substantial-appearing boxes.** This fact is especially true if it is easy to see that the interior contents are obviously or apparently delicate.

d. PROTECTION AGAINST THE ELEMENTS. Shipments consigned to remote destinations will be exposed to extreme conditions of moisture and

Examples Of Shipping Weight Reductions For Delicate Equipment By Revised Packaging

	Equipment Net Weight	Former Gross Shipping Weight	New Gross Shipping Weight	Percentage Reduction
Machine A	191 lbs.	352 lbs.	246 lbs.	30 per cent
Machine B	484 lbs.	764 lbs.	578 lbs.	24 per cent
Machine C	1074 lbs.	1530 lbs.	1275 lbs.	17 per cent
Machine D	1356 lbs.	1794 lbs.	1544 lbs.	14 per cent

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dirt at handling points. For that reason there must be a covering of some sort. Many types of barrier materials are available for this application. Appearance, cost and performance will decide which one should be selected for the product.

e. AUXILIARY PACKAGING OF PRODUCT COMPONENTS. Many times, equipment covers must be removed to gain access to its shipping-support points. In other instances, entire assemblies must be separately packaged for their own specific protection. Both requirements present an opportunity to the engineer to display his ingenuity. How he treats this aspect will contribute greatly to the success of the entire package.

3. Testing Stage

Testing inevitably is resolved into two separate phases: The laboratory test and the trial shipment test. Both serve a logical and useful purpose.

LABORATORY PACKAGING TESTS for delicate equipment usually cannot be destructive if the equipment itself is included directly in them, because of the cost factor involved. For this reason the more severe tests such as drum tests and drop tests are precluded by necessity. It is possible, however, to subject even electronic machines to simple vibration and impact tests by using standard laboratory equipment. Tests can be performed on company-owned equipment or on that of outside consulting organizations. The high investment cost plus the space-consuming nature of such equipment usually dictates use of the latter.

TRIAL SHIPMENT TESTS are conducted as a follow-up to laboratory tests and offer an excellent chance to correlate theoretical data, previously gathered, with practical experience for future design work.

The most conclusive type of trial shipment is the actual application of the proposed package to the product as a temporary substitute for its regular container. Care must be exercised at this time to assure that no *special* materials or methods are used which cannot be duplicated later on a *production* basis. Without that precaution the shipment would not be a true simulation of the production usage of the package, and the validity of the trial would consequently be threatened.

In the case of radically new designs a formal test-permit must be obtained from the appropriate Freight Classification Committee before this action can be taken. The company traffic manager can arrange for such a permit through channels familiar to him.

The number of trial shipments depends upon the method of shipment used and the degree of cooperation expected in obtaining results from the company's own field organization. For LCL shipments, five per cent of the yearly volume should be an adequate amount. This involves a shipping period of about three weeks, which is sufficient to allow for shipments to many different destinations in the country by representative routes.

Trial shipment results can best be obtained by enclosing within the shipment packages simple check-off type questionnaires which are return-addressed to the factory. By explaining the experiment briefly and pointing out the need for reliable results, the person receiving the questionnaire (as he unpacks the equipment) will be made to feel that he is part of the program, and will oblige by completing and returning the form.

In the case of severe damage to a product shipped on a trial basis, photographs or a return of the package and contents are mandatory. Actual examinations of the damage, plus a study of the routing, invariably result in revision of one or

General Specifications For Wirebound Crates for Delicate Equipment

1. All lumber and veneer must be well-seasoned, sound and free from:
   a. Bad cross grain or knots which would interfere with nailing or stapling.
   b. Knots greater than one-third the width of slat or batten material.
   c. Knots greater than one-fourth the width of cleat material.
2. Each section of the crate mat must have edge slats at both edges.
3. Crate rigidity must be provided by the use of diagonals on each section of the mat. Diagonals may be omitted when a slope of 14 degrees cannot be provided. In those cases, rigidity must be provided by extra wide slats, intermediate cleats, or both.
4. Tops must be solid or closely fitted, and must be constructed with one batten adjacent to the edge of at least two cleats of the mat.
5. All surfaces of the crate, except the base, must have sufficient slats, cleats or battens to cover at least 50 per cent of the total area of the crate face.
6. Crates with continuous wires must be closed by securely twisting each pair of wires with not less than three complete turns. Crates with loop ties must be closed by passing one loop through the other of each pair of wires and bending it back sharply upon itself.
7. All articles must be securely anchored, blocked or suspended within the crate.
8. A minimum clearance of one inch must be maintained between the crate interior and finished surfaces of its contents. All finished surfaces of the equipment except legs must be covered. If the above minimum clearance must be reduced for any reason, all finished surfaces of the equipment must be protected by pads or padding having a minimum thickness of one-fourth inch.

Items For Inclusion In A Package Comparison

1. Type and Cost of Exterior Container.
2. Types and Costs of Auxiliary Materials.
   a. Hardware for securing the equipment to the package.
   b. Interior containers for disassembled components.
   c. Protective covering.
   d. Miscellaneous materials:
      (1) Tapes (gummed, high-strength, cloth, etc.)
      (2) Labels.
      (3) Artwork.
3. Packing labor cost.
4. Total package cost.
5. Gross shipping weights.
6. Ease of use.

5., 6. Other possible types of light-weight containers available for smaller delicate equipment. In this application the wirebound crate was found most favorable from the point of view of use and cost reduction.

both when the package is permanently adopted.

Probably the best analysis of trial shipment results can be made by comparing the average damage percentage with that for the normal previous packaging method for the equipment. This comparison, and the general reaction to the package by its users, will assist in determining its success on a permanent basis.

4. Final Engineering Stage

Once a package design has proven itself on a cost and performance comparison with other alternatives, it can be released to the using departments. Just how that is to be accomplished will vary from company to company. However, the best policy is to make the release as formal as possible to assure complete compliance with the design all along the way. Engineering drawings and assigned part numbers for all components and bills of material for the complete package are strongly recommended. By using that procedure the package components can be procured, inspected and stocked on a systematized basis. An exploded diagram showing the packing sequence (and items involved) should be developed to bring the exact use of the package into clear focus for using personnel.

Some form of artwork should also be considered in a packaging revision if the situation warrants it. Most delicate equipment is the industry-goods type of product and, as such, seldom requires the amount of eye-catching artwork that consumer product items demand. Nevertheless, any container shipped by common carrier is an opportunity to advertise the company name. A well-designed package also has a decidedly favorable impact upon any customer — if it bears the finishing touch of an attractive symbol or trademark.

5. Follow-Up Stage

Follow-up for a new package design consists of:

a. Assistance in training of packing personnel in cooperation with their supervisors.

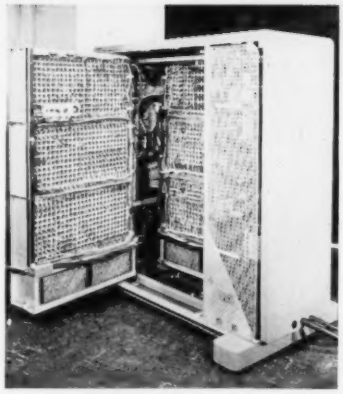
b. The working out of a handling and storage procedure for the containers as received from suppliers.

c. Necessary modifications to improve performance and to reduce cost.

d. Development of revised flow patterns for packing materials and the product. This work includes the changing of departmental layouts and the installation of auxiliary handling devices such as conveyors, hoists, fork trucks, etc.

Follow-up, therefore, is the process of getting the package design into production and keeping it there in a coordinated fashion. The responsibility is a broad one and requires an individual who can undertake all aspects of it competently.

The application of these basic principles of package design has accounted for notable examples of improvement and cost reduction in delicate equipment packaging. The significant point is that, in most cases, improvement has meant extreme modification to a degree thought to be impossible until it was actually tried.



7. A behemoth of the delicate equipment species. This computer unit weighs 1400 pounds and contains 1200 electronic tubes plus many other equally sensitive components.

8. The same machine (Photo 7) packed for shipment in its wirebound crate. The package dimensions are 53 inches long by 33 inches wide by 58 inches high. Five heavy-duty shock mounts formerly used were successfully replaced here by solid wooden blocks. Note the skid bottom for movement by fork trucks or rollers.

Table of Dimensions for Wirebound Crates for Delicate Equipment (in inches)

Crate Component	Equipment Net Weight		
	0-325 pounds	325-500 pounds	500-1600 pounds
MAT:			
Slat dimensions:			
Minimum thickness:			
Edge slats	7/32	1/4	3/8
Intermediate slats	1/6	7/32	1/4
Minimum width:			
Vertical & horizontal slats	2 3/4	2 3/4	2 3/4
Diagonal slats	2 3/8	2 3/8	2 3/8
Cleat Dimensions:			
Minimum cross-sectional area	13/16x7/8	13/16x7/8	13/16x7/8
Maximum spacing,	24	24	24
Binding wire:			
Minimum gage	14	13	12
Maximum spacing	10	10	10
TOP:			
Minimum batten sizes			
Edge battens	3/4x7/8	3/4x7/8	3/4x7/8
Intermediate battens	3/4x1 3/8	3/4x1 3/8	3/4x1 3/8
Maximum batten spacing	16	16	16
Minimum lumber thickness Not less than mat slat thickness			
BASE:			
Minimum lumber thickness	9/16	9/16	9/16
Minimum cross-sectional area	11	19	28

Engineering a new packaging line for Diamond Crystal Salt Company

By R. Bruce Holmgren
Editor, Package Engineering

Here is a searching analysis of one plant's experience in developing a new packaging line to a production rate of operation. While this article discusses a highly specialized packaging task, it merits widespread attention because it represents the joining of three levels of activity to solve a common problem: (1) The plant management, (2) the engineering and operating group, and (3) the men who actually man the machines and keep them running—all contributed freely and candidly of their experience, synthesized into this article.

Diamond Crystal Salt Company is now operating its new packaging line of 26-ounce salt cans at its Akron, Ohio, plant. To get this line into successful operation the plant not only drew heavily on the experience of its company's St. Clair, Michigan, plant, but also relied on an engineering task force to coordinate the work of the equipment and personnel assigned to this line at the Akron plant.

Basically, what happens is that the new line not only fills, closes and labels these packages but also fabricates the can prior to filling. Replacing a packaging line which utilized containers furnished by outside suppliers, the new operation has attained such effective coordination of people and machines that it runs with one less worker than did the old line—even though the new line has the additional job of making the containers.

To understand the analysis of this operation which appears in succeeding paragraphs it may prove helpful to take a quick look at the line as a whole: Starting point is the formation of spiraly-wound can bodies. Once cut from lengths of tubing from which they are formed, these individual bodies go to an alternate feeding unit. Here, the conveyor carrying the bodies meets a conveyor carrying filled cans which require covers.

Next operation is that an automatic capper puts a bottom on the can body and a top on the filled can. After going through a shrinker, empty cans move to the filler and the filled cans (now complete with tops) go through a labeling operation. Meanwhile, cans leaving the filler return to the capper for their tops—before moving to the labeler. After receiving labels, the completed cans are case-packed, sealed and go to storage areas.

Can Forming Problems

To form the can bodies the plant uses an asphalting unit of the company's own development and a Langston tube making machine. Essence of the operation is that three piles of stock feed to the winder, to become a continuous length of spiral tubing. Next, this tubing is cut into lengths to provide the individual can bodies. Proper formation of can bodies depends on (1) a proper tar bath or asphalt coating, (2) a correct glue application, (3) correct belt adjustment and (4) accurate setting of knives.

Focal point of the tar bath is the application of an even coating or film to the ply of stock. Application temperature is thermostatically controlled, to range between 390 and 400 degrees F, as a general rule—but in summer a lower temperature is satisfactory. A charting unit makes a continuous record of temperatures used. A wiping blade removes excess film.

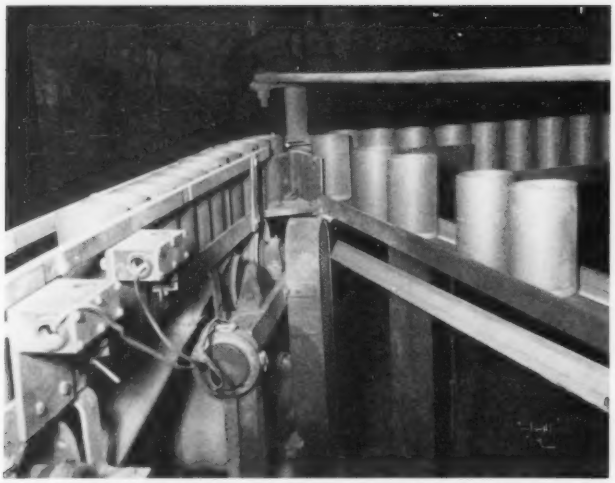
At the glue unit, the ply which receives the glue gets a coating of standard packaging adhesive, at a temperature of about 100 degrees F—but not over 100 degrees, in order to avoid boiling. Here, as at the unit handling the ply receiving the tar bath, there is a wiper blade to remove excess film. Next, the three plies meet, one with an asphalt treatment, one with glue, and the third going direct from its roll to the forming mandrel.

The operator is very careful to keep his belt tensions properly adjusted. Also, he watches the angle, to be sure to close the gap—so that the spiral is in perfect alignment. Once the spiral tube is formed, it goes to the cutting unit which automatically cuts the tubing into can bodies, forming six at a cutting—with the seven knives of the machine.

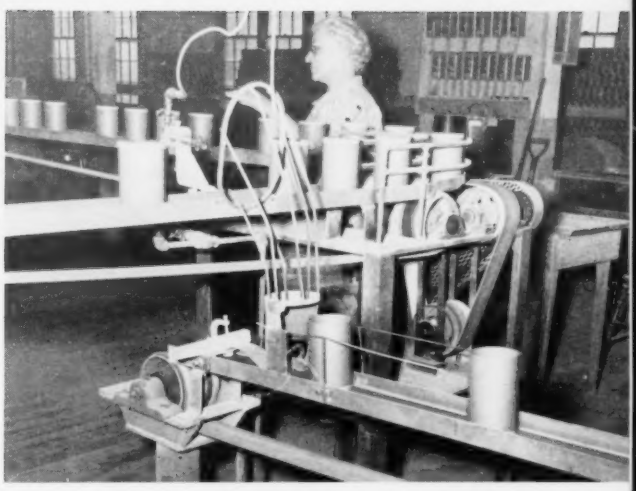
How Can Bodies Move

Next, the individual can bodies drop to vertical position, to ride on a moving conveyor belt which carries them to the alternate feeding unit. This conveyor is a loop about 50 feet long, so that can bodies make about 100 feet of travel prior to reaching the feeding unit. This length of conveyor provides storage or backlog of can bodies.

One of the highlights of the entire



This alternating feed is a focal point in Diamond Crystal Salt's new line. Filled salt cans (at left) "blend" alternately with empty can bodies (at right) and move down conveyor (right foreground) toward capper. Different weights (empty and filled cans) made alternating difficult.



Each empty can makes a 90-degree turn as it is blown by air through this turn-over device. Air does not affect filled and capped cans, which remain on conveyor. Empty cans (having received bottom cap first at capper) thus land right side up, for filling.

operation is the way in which Diamond Crystal Salt engineers provide an alternation of can bodies and filled cans. Two conveyors converge at the alternate feeding unit, which is a product of the machinery development department of General Foods. One conveyor carries can bodies and the other carries filled cans. Purpose of "blending" the flow, to have can bodies and filled cans alternate, is to provide a correct flow into the capper.

A major phase of solving this problem was the getting of correct pressure on filled cans. There has to be enough pressure to push the cans through but not so much pressure that it tends to flatten out the circumferential top opening; this flattening-out makes capping difficult. Plant engineers and operating men solved the problem by using two micro-switches. One connects with the filler, to stop the filling and movement of cans from the filler and the other stops the line of cans to prevent jamming between the switch point and the alternating feed unit itself.

There is a 12-can space between these two points, which thus assures adequate pressure for proper can movement. In this connection, the plant found it essential to polish the horizontal plates of the alternating feeder. This was necessary in order to give slide to the movement of cans. It is important to avoid jams at the alternating feeder because such jamming might cause a reversal in feeding. This would result in can bodies and filled cans getting into each others' stations on the capper.

Preparation For Capping

After getting onto the conveyor leading to the capper, the can bodies and filled cans move through a glue application unit of the company's own development. While a belt moves each can or body in a vertical rotation, a glue roller moving horizontally applies a thin film of glue to the outside edge. This glue will secure the cap to the body. An important adjustment at this point is the correct setting of the film, keeping it slightly on the light side—for best results. The glue strip itself is ⅛ to 3/16 inches wide.

To provide stock for capping, the plant has its own duplexing operation. Taking one ply of slit kraft and the other of strawboard, this operation joins them, putting a film of asphalt in between the plies. The man han-

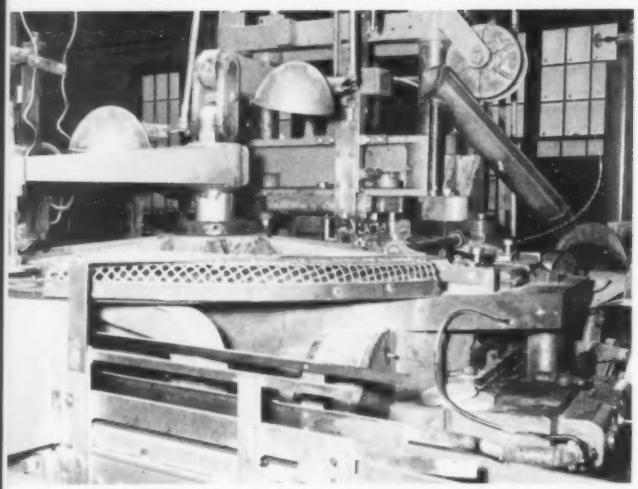
Highlights of Diamond Crystal Salt's new packaging line

1. There are just five members of the line crew, plus part of the time of one other person.

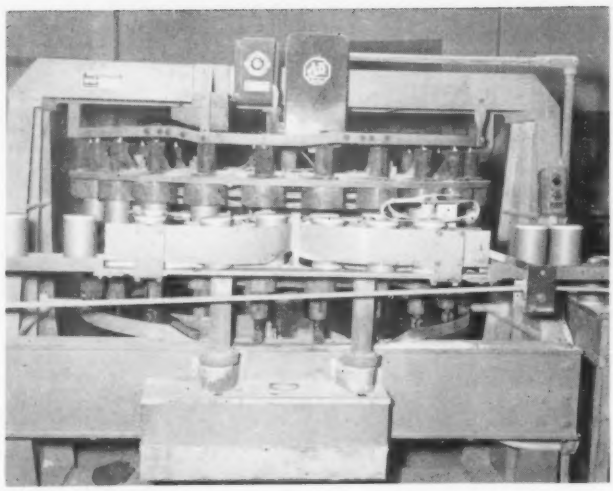
2. A typical shift turns out around 1,100 cases of individual cans.

3. The automatic capper, operating at 65 cans a minute, sets the speed of the line.

4. Packaging material scrapped amounts to about 25 to 50 cans out of 11,000.



Automatically, this capper forms and applies caps to can bodies, forms and staples metal pouring spouts and places heat seal label over each spout. This machine must operate in perfect time, requires careful supervision.



Leaving the capper, cans move through this shrinker, which uses pressure and heat to complete the capping job. Belt-and-spring combination (at right) under which capped cans pass before entering, does much to reduce spoilage, by pressing down caps.

dling this operation is careful to avoid excessive use of asphalt, because it would tend to gum the dies of the capper.

An important feature of cap stock preparation is watching the moisture content. Too much moisture in the stock causes it to flare out when formed. Too little moisture means that the stock cracks during the forming process. Plant crew members judge the moisture content by visual inspection and by studying the performance of the stock on the machines. As a means of moisture content control, the plant avoids preparing cover stock too far ahead of time. Its technicians suggest that seven to nine days ahead (they date all rolls formed) is about right, as this interval permits a sort of equalization of the moisture—like a diffusion action.

Operation Of Capper

Perhaps the most critical and controlling point of the entire line is the capper. This machine, designed by General Foods Corporation, forms the caps and puts them on the cans. Thus, an empty can body receives its bottom, and a filled can (which earlier had gone through this machine to get its bottom) receives its top. A feature of the top application operation is the forming and securing of the aluminum pouring spout on each can top.

Stock being formed into caps goes through a beeswax treatment, passing between two pieces of this material, which acts as a lubricant to make the stock slide and draw easily. An intricate timing mechanism holds each can body while it receives its cap—which is formed under plates having a temperature of 100 to 150 degrees F. Purpose of this heat is to soften the paper in order to prevent its cracking during the forming stage.

After the cap, forming takes place, the caps which are to be tops of filled cans receive their pouring spouts. These are formed with a die punch, using roll-fed aluminum, which is 0.012 to 0.013 inches thick. The staple wire also is roll-fed. First, the forming die stamps out the aluminum, then the wire goes in, and next, the staple die pushes down the staple. Inside, a small horse shoe clamps and secures the staple.

Next, an application of heat sealing label paper goes on top of the metal pouring spout. An anvil rises from below the cap, providing a firm base for the heat seal, which takes place from above the cap. The paper is automatically fed, cut off and applied. After this, the cap goes into place on the filled can.

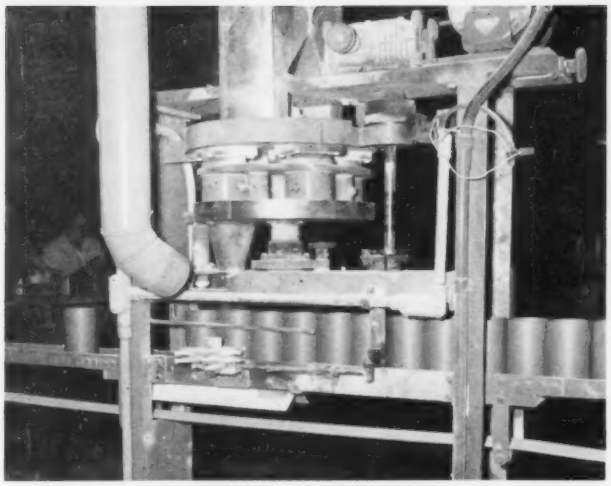
Movement Through Shrinker

Illustrative of the critical adjustment of machinery is that of the shrinker also designed by General Foods, into which cans go after leaving the capper. A small star wheel controls the feed-in of cans, thus governing their delivery to a pair of larger star wheels. Two wheels are necessary in order to get cans in perfect balance. If the small star wheel is out of time, the cans smash into the larger star wheels.

Cans go into place in shrinker pedestals, which ride around on a track. There is a dead position at the point where cans enter the machine. Once in the machine, each can, on its pedestal, rises into its heater head. A second rising action completes the shrinking cycle, after which the cans are indexed out of the shrinker. They return to the same conveyor belt from which they entered this machine.

Important adjustments of this equipment include proper temperature and clean heater heads. In order to make sure that these heads are free of dust, lint and glue it is necessary to take them out and wash them from time to time. Another vital adjustment is the timing. For example, all the star wheels must be in virtually perfect timing.

The small amount of scrap arising from this operation emphasizes the effectiveness of the various equipment adjustments and illustrates the value



This volumetric filler puts 26 ounces of salt in each can. A solenoid controls stopping and starting of filler and is regulated by Micro switch at alternating feed unit. When line is stopped, filling operation is stopped, to avoid sending out too many cans, thus creating pressure on cans.

End of packaging line is the labeling operation. Cans leave belt, are turned 90 degrees, to go through labeler horizontally. After labeling, cans are uprighted, move away from line. They go through individual inspection prior to case packing.

of close timing. For example, a cap control device, which Diamond Crystal Salt's engineers worked out, located at the small star wheel, has resulted in very substantial reductions of scrap loss. This device uses a spring and a belt to press down on caps prior to containers entering the shrinker.

How Cans Separate

An important operation that takes place after filled and empty cans leave the shrinker is the separating of cans so that filled and sealed cans move to the labeler and empty cans move to the filler. To make this separation there is an air blast action to blow the empty cans off the line, and into a chute—which delivers each empty can to the conveyor with the open end of the can up, ready to enter the filler. The air is enough to blow over the empty cans but not enough to disturb the full cans.

Once tipped over and riding on the conveyor belt, the empties move 85 feet on a 3½-inch conveyor belt leading to the General Foods volumetric filler. To make sure that all cans arriving at the filler are in vertical position there is a device which Diamond Crystal Salt developed to take improperly positioned cans off the line.

Just after the air-inverting unit is a cut-out section of conveyor. This is slightly tilted. The result is that any can which is not vertical and which is resting on its side, has to roll off the line—through this cut-out area. Without this section, cans improperly positioned might jam the filler upon their arrival at that point.

Meanwhile, the filled cans (now capped at both ends) move by conveyor to the labeling operation, where they are tipped 90 degrees in order to "roll" through a Burt labeler. Drive belts control the roll of cans. Four small wheels function to apply a film of resin, the spots of which pick up the label and position it on the can, after which the label is rolled around the can and lap-glued in the usual manner. Careful adjustment insures that the glue gets on the glue strip of the label.

Filling Of Cans

Once the empty cans reach the filler there is a star wheel to index them into the machine. The salt itself comes from an overhead supply, goes through a tube to a small reservoir, which feeds the volume tubes. These are adjusted for the desired weight, i. e., 26 ounces in each can. The only fluctuation is an occasional variance in the density of the salt itself—and cans are checkweighed regularly.

A solenoid controls the stopping and starting of the filling machine. This solenoid is actuated by a microswitch which is located at the alternating feed unit. This means that when the line is stopped at the alternating feed the filling operation stops—to avoid creating undue pressure (or a jam) at the point of alternating feed.

There is a cam that actuates the star wheel, and this is coordinated with the filling of individual cans. The star wheel moves just one position at a time, until released by the cam. At the end of a day, when shutting down this machine, it is necessary to make sure this cam locks. Otherwise, the empty cans would continue moving right on through the machine. During the run, cans when filled move back to the capper, the go to the labeler.

Final Packaging Stages

At the end of the labeling operation the labeled cans go through a twisting unit which returns them to vertical position—and from here they move to the case packing station. This is done manually and serves as an inspection point. Diamond Crystal Salt regards this inspection of individual packages as a very important step in the total packaging operation—to be sure that packages leave the plant in proper condition.

From this point, cases of individual

cans go through a Ferguson case sealer, after which the sealed cases go to the plant's case storage room. There is an area of the packaging floor, near the case sealer, which is used for special packaging jobs such as assembling "deals" consisting of combinations of packages.

Throughout this operation a coordinated series of conveyors facilitates movement of cans. At various points such as conveyor junctions there are transfer discs to facilitate 90-degree turns.

How the engineers look at Diamond Crystal Salt's new line

Many problems faced the engineering and operating groups at the Akron plant in the course of getting the present packaging line into production. Their approach to these problems is a case history of just how to get the "bugs" out of a packaging line.

Most difficult problem was that of alternating an empty tube and a filled container. This entailed not only two very different weights but also the problem of can bodies "bouncing" because of inadequate pressure, or being squeezed by excessive pressure. A major feature of the solution was the use of micro-switches to control the flow of cans, to limit the pressure applied at the point of alternating feed.

It took considerable experimentation with different can body stocks to get just the right one, a can body strong enough to withstand the pressure from the filled cans. In this connection, the plant had to learn just how to form the can body. This meant getting the right asphalt and the right temperatures—as described in the main text of this article.

Two other aspects of getting the correct alternating feed were the polishing of plates to facilitate can movement and the use of air to boost out the empty can bodies. Focal point of this was getting the right amount of air to boost the can body without tipping it over.

Making Of Changes

Because the can would not stand up at the air jet point of the separator the plant installed an aluminum headplate on top of the belt. Result was to make the portion of the empty can in this area hit this plate. This causes a proper tipping-over, in connection with a split-second drag. Result of this is that empty cans are properly inverted for movement to the filling equipment.

Another aid to effective operation was the installation of a belt-like pressure plate just before cans go into the shrinker. Purpose of this device (which uses a spring for pressure) is to straighten crooked caps and to help keep empty cans on the belt. Before the engineers worked out this device, the lag on the empty can would result in its catching on the points of the star wheel—thus jamming the shrinker.

The contact unit at this point of the device (where the spring provides the pressure) is coated with Teflon. Effect of this is to prevent the building up of a residue of glue, paper fuzz and the like.

Machinery Modifications

Initially, there was a vibrator on the filler. However, Diamond Crystal Salt's operating group took this off because it proved unnecessary to the running of the machine. Further, it was noisy.

To avoid jamming the gate of the feed-in at the shrinker, they provided an automatic motor cut-off. Also, there is a limit switch at the gate. Because the shrinker was originally designed for a taller can than this plant uses, it proved unsatisfactory for the cans being used. To replace the bottom finger action originally provided, there is a new trigger and release mechanism, using a star wheel action.

To get these changes made and to get the packaging line into normal operation, Diamond Crystal Salt's management group assigned a three-man task force to the project and kept these men on the line for several months. This force included a skilled mechanic, an industrial engineer and an engineer experienced as a trouble shooter.

Unexpected Difficulties

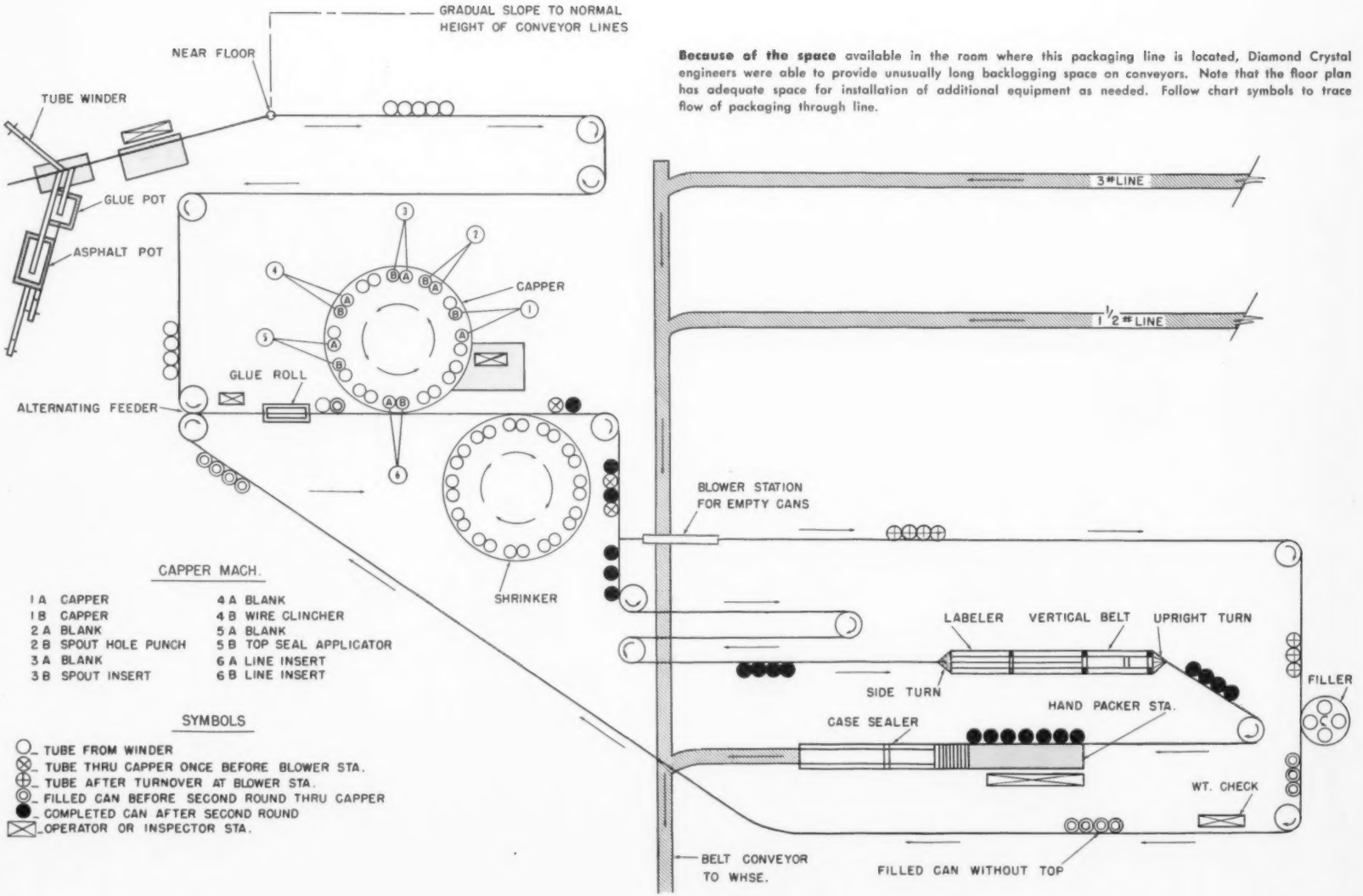
In getting this line started the Akron plant had the help of the St. Clair plant, where similar equipment has been in operation some time. Engineers from St. Clair laid out the new line in Akron. Further, the Akron operating group had the advice of machinery specialists of General Foods, men skilled in the use of the principal machinery items on the line. Even so, many problems arose, such as those described in the preceding paragraphs.

To solve these mechanical and operational problems the management group of the Akron plant took a realistic view of them and simply assigned the necessary manpower to the job—to get the line producing reasonably well. Now, the equipment problems are well under control and the line personnel are becoming increasingly familiar with its operation.

As a result, a typical shift's production is now between 1,000 and 1,100 cases, which approaches the probable top capacity of the line—1,200 cases per normal shift. Further, the plant is getting this production, including the fabrication of the cans, with less manpower than was necessary on the old line which used containers furnished from the outside.

Thus, the line operates at such an efficiency that five principal workers handle it. These include one can body maker, one capper operator, one woman who inspects and checks the line, one woman operating the labeler, and one man packing cases. In addition, one man devotes part of his time to the duplexing of cap stock.

Because of the space available in the room where this packaging line is located, Diamond Crystal engineers were able to provide unusually long backlogging space on conveyors. Note that the floor plan has adequate space for installation of additional equipment as needed. Follow chart symbols to trace flow of packaging through line.



If you can smell the product, it is probably under-packaged

By Laurence V. Burton,
Consulting Editor, Package Engineering

Examining a poor package for a good product, Dr. Burton reviews some packaging factors involved in problems of flavor loss and reduction of shelf-life—and points to some solutions of these difficulties.

Several transparent bags of dehydrated vegetable relish came to light the other day. If there ever was such a thing as a competition for the *poorest* package of the year, this package would have been a successful candidate for the first prize. Yet, the product itself was superlatively good when it was fresh. It is doubtful if a more delectable item in its line could be manufactured.

Yet, the product was not selling. The manufacturer was discouraged. He had decided to abandon the item and was giving away his small stock to his friends. He would call it a day, and hereafter would stick to his normal business. This was his first entry into the packaged consumer foods business with its fiercely competitive market, and it had proved most unsatisfactory.

What Was Wrong?

His whole trouble was in the packaging. Two important features of his package were at fault:

(1) The appearance of the package was all wrong. The transparent bag showed the product clearly, and it had all the eye appeal of green chopped hay. This feature is mentioned here only because it has a bearing on impulse purchases and, in turn, on rate of turnover in the trade, which determines the shelf-life needed by the product. Even if the package had been an eye-catching one with plenty of "buy-me" appeal, it is doubtful if the goods would have enjoyed much popularity unless, perchance, the turnover could have been sufficiently rapid to overcome the second fault. This second fault was with the functional packaging.

(2) The shelf-life of this relish was remarkably short. The relish consisted of finely cut dehydrated vegetables and spices. All dehydrated vegetables quickly lose their original character and in a short time take on a flavor like hay. In an item like relish, the amount of spices present will effectively mask the hay-flavor —as long as the spice flavor remains.

Flavor Loss Explained

The packaging job done here was elementary. A plain transparent cellophane bag held four ounces of product. The bag was sealed with a small strip of pressure sensitive cellophane adhesive tape. Even the sealing was good enough only to prevent the product from falling out of the bag if held upside down. The bag was not printed in any way. The label was a small printed square of paper that had been inserted into the bag, supposedly in a manner that would permit the printing to be visible through the bag. Unfortunately, however, the product frequently obscured the printing. In one bag it was impossible to see the label at all, yet it was there.

Even if the bag had been printed, it is doubtful if the manufacturer would have been aware of the barrier effect of printing inks, nor the still more obscure matter of the softening effect of essential oils on some printing inks.

Of all the many varieties of cellophane to choose from, the package was made from the one least suited to be a barrier to flavor escape. If he had exposed his product in open, bulk containers the flavor-loss could not have been as rapid as it was from the four-ounce bags, for in the latter the surface area is several times larger than in, say, a 25-pound open tin container.

Small wonder, then, that the aroma passed rapidly out of the packages and filled the room—when the goods were freshly made. But in two weeks the product had lost so much of its aroma that its quality had noticeably deteriorated. And in a month nobody liked it, and its flavor had become very bland, almost blah.

Initial Shelf Life Problems

In considering only the technical aspects of packaging you cannot safely ignore the merchandising aspects and their bearing on the technical requirements of the product to be packaged. Thus, when a new product is being introduced to the market it must be packaged for a fairly long shelf-life — usually much longer than would normally be required if the product were fairly well-known and enjoyed a steady sale. Really smart companies are fully aware of the slowness of acceptance of a new product. Hence, they put on a tremendous amount of sales pressure and sales promotion to get people to try the new goods.

Under such conditions the need for building in an extra-long shelf-life is somewhat reduced. It is doubtful, however, if it would be possible to stimulate a rapid turnover of an item like our relish, no matter how much advertising were put behind it. Certainly it would be impossible to make the product sell so rapidly that the package would not require any barrier to flavor-loss. People do not consume

relish in any such quantities as this.

With a package that lacked all eye-appeal, the problem of slow turnover was greatly aggravated from the purely protective viewpoint. One surmises that the requirements of this product during its introductory days, without any sales promotion effort, should have been for a shelf-life of about eight months instead of its estimated half-month. (Any longer built-in shelf-life would probably be superfluous, for store managers would no doubt throw it out by then.) If the package had been adequate from the viewpoint of appearance, so that a reasonably good rate of sale could be expected, even without any sales promotion, then a shelf-life of perhaps five months would have been adequate.

If, however, there had been adequate sales promotion, and if the package had been attractive, it is probable that a shelf-life of as little as two or three months would have been adequate in the introductory stages of the new item. After the product had been fairly well established on the market it would depend on the experience record to determine the probable safe average shelf-life under the new conditions. The shelf-life needed is indissolubly tied up with rate of turnover in the trade.

Shelf Life And Costs

These differing shelf-lives often have an important bearing on the cost of the package—possibly also on the consequent cost of the type of machinery needed to package the product in the necessary package. For the postulated eight-month shelf-life the product would have to be placed in a container capable of retaining the volatile spice aromas for that period of time. Such a container could be a glass jar, a metal can, a foil-lined sealed carton, or a sealed, laminated pouch placed loose in a carton. The pouch might be made of a coated or waxed glassine or a glassine-plastic film laminate.

With a shorter required shelf-life it is usually possible to get the desired shelf-life in a slightly less expensive package. And with the very rapid turnover that is possible with a popular item that is adequately advertised and promoted, it is usually possible to use a package with the minimum of cost.

But you cannot get away from speed of turnover in the trade as an important factor in economic functional packaging.

All the preceding is not to decry the consumer-attraction of a good smelling product. Indeed, a Chicago soap manufacturer packages several bars of a perfumed soap in a polyethylene bag for supermarket display. He makes a virtue out of the fact that polyethylene film is not much of a barrier to essential oils. Hence anyone who is near his soap can smell it. But, when the aroma of the contents comes through the package and perfumes the surrounding air, you have a rapidly wasting asset.

In short, unless you have actually planned it that way, if you can smell a packaged product, it has not been properly packaged.

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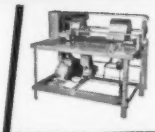
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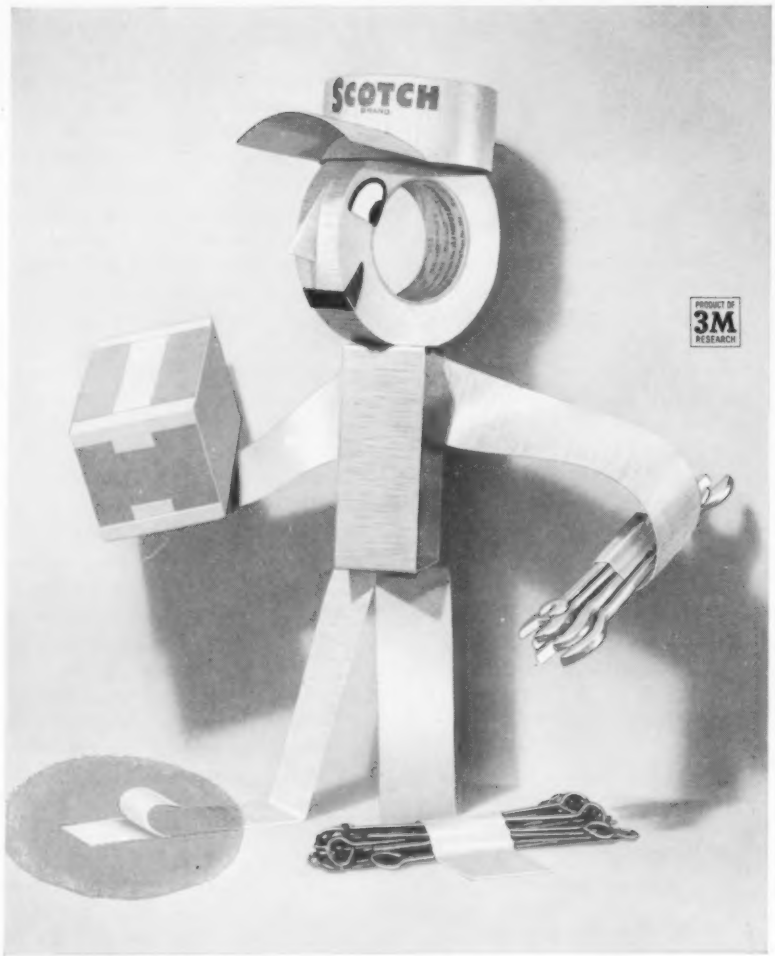

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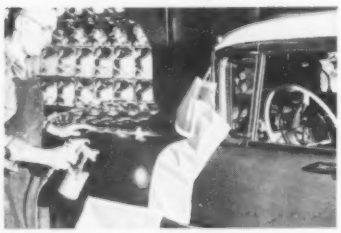

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AMA holds silver anniversary packaging show and conference

With nearly 400 exhibitors offering their equipment, materials and services to an expected audience of 30,000 visitors, American Management Association is holding its 25th anniversary National Packaging Exposition at Convention Hall, Atlantic City, April 9-12.

AMA is holding its National Packaging Conference in the ballroom of Convention Hall, April 9-11. Thus, the conference sessions will take place during the first three mornings of the show. On conference days the show itself will not open until noon.

To let executives attend both the conference and show without conflicts, AMA has scheduled both events as follows:

Conference:

Mon., April 9th — 9 a.m. to 12:30 p.m.
Tues., April 10th — 9 a.m. to 12:30 p.m.
Wed., April 11th — 9 a.m. to 12:30 p.m.

Exposition:

Mon., April 9th — Noon to 6 p.m.
Tues., April 10th — Noon to 9 p.m.
Wed., April 11th — Noon to 6 p.m.
Thur., April 12th — 10 a.m. to 3 p.m.

Conference Program

Monday, April 9th:

10:00 a.m. Conference opening.

10:15 a.m. Increasing sales with better packaging through marketing research, by Richard Manville, Richard Manville Research, New York.

11:15 a.m. In-plant parts handling at Douglas Aircraft, by T. E. Mecham, chief of plant engineering, El Segundo Division, Douglas Aircraft Co. Inc., El Segundo, California.

Tuesday, April 10th:

9:15 a.m. The synthesis of an adhesion program, by Dr. Frank C. Campins, president Polymer Industries, Inc., Springdale, Connecticut.

10:15 a.m. Packaging the panoramic windshield, by M. L. Koester, Libby-Owens-Ford Glass Co.

10:45 a.m. How to measure the quality of printed materials by Donald Macaulay, president, Paper Qaulity Control, Inc., Chappaqua, New York.

Wednesday, April 11th:

9:15 a.m. Organizing and managing the packaging function — a three-company panel, with speakers from Ayerst Laboratories, Rouses Point, New York; Colgate-Palmolive Co., Jersey City, and International Harvester Co., Chicago.

11:30 a.m. Engineering the packaging of hard goods, by John A. Newton, factory manager, Valve Division, Thompson Products, Inc., Cleveland.

Features Of Program

"The importance of managing the packaging function is now overriding," A. K. Thorn, manager of AMA's packaging division pointed out as he explained that the conference speakers will not only review progress along technical lines but also will emphasize the importance and complexity of packaging — and the need for qualified management personnel in packaging.

According to AMA, the conference will stress attention to technique, efficiency, profit-consciousness and managerial integration. Speakers discussing the specific topics on the program will relate their respective detailed presentations to these broad concepts.

Registration at the conference is open to non-members as well as members of AMA. Fees are as follows: Full conference (three mornings), AMA members, $15.00; non-members, $20.00; a single session, AMA members, $6.00; non-members, $8.00. Badges of conference registrants will admit them to the exposition but badges for the exposition are not valid for the conference sessions.

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Aluminum Company of America	460
Aluminum Foils, Inc.	1331
American Can Company	523
American Excelsior Corporation	270
American Latex Fibre Corporation	929
American Marking Corporation	1038
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American Type Founders Inc.	655
Ampano Engineering Co., Inc.	928
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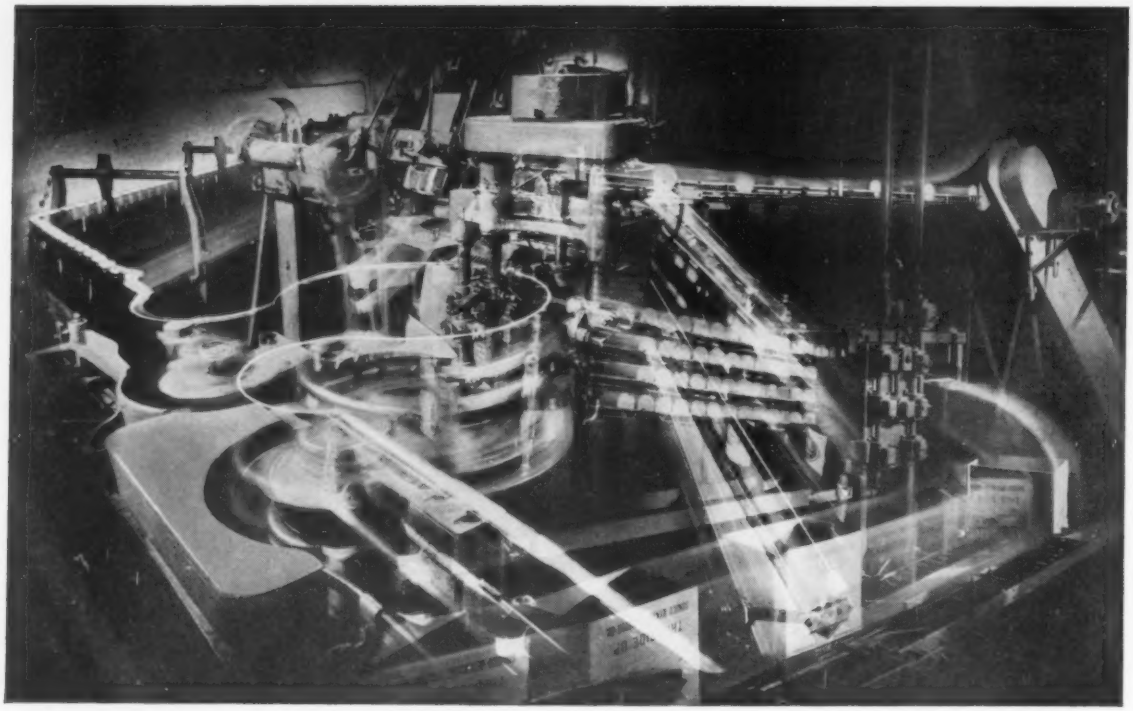


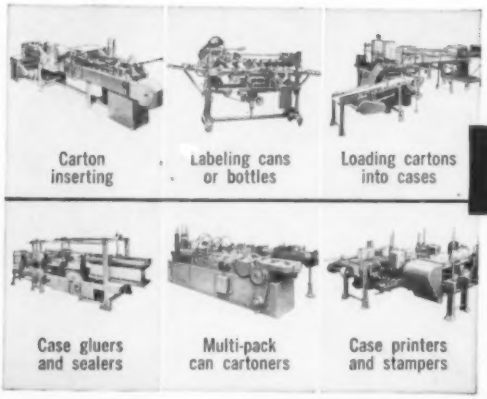
Most dependable motions in packaging

ABOVE: *Motion study of a Standard-Knapp 830 Bottle Packer and a Standard-Knapp Can Packer in operation. Fast, constant-flow packaging such as this is available from S-K for practically any type package or product.*

Model 830 Packers are available in models with 2-, 3-, 4-, 5- or 6-lanes and in a duplex type with 12-lanes. They receive bottles, cans or jars in a standing position, divide them into the required number of lanes, form the load pattern and then guide them into cases.

Standard-Knapp Can Packers perform the same functions, but handle the cans in a rolling position. These machines are available in a wide range of models to meet the most varied requirements.

Each motion of a Standard-Knapp Case Packer is meticulously engineered. Then it is delivered by mechanisms that combine highest quality metals, precision machining and assembly — and the priceless factor of long experience. For more information about our Case Packers and other packaging equipment, write Dept. O for our catalogs.



STANDARD-KNAPP

DIVISION OF EMHART MFG. CO.

PORTLAND, CONNECTICUT

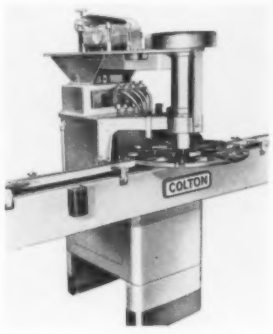
Latin American Representatives: American Steel Export Co., New York, N. Y.

Announcements of machinery and products

1. Beneath each announcement is a code number. As you select items on which you want more information, *note* this number.
2. Now, *circle* the corresponding numbers on the postcard, located inside front cover.
3. Next, *fill in* your name and address.
4. Then, *mail* the card — we pay the postage.

Liquid Filling Machinery

Arthur Colton Co. announces an improved model of its multiple liquid filler, and reports that this new machine



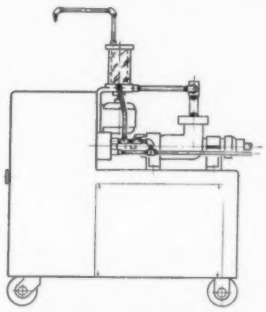
has a filling accuracy of within one per cent. Special features of the equipment include a new positive, precision metering cylinder and valve assembly, and a new filling mechanism. This latter provides a metered volumetric fill, and includes a built-in needle valve which gives an unusual "suck-back" no-drip control. Circle No. 1.

Padded Shipping Bag

Jiffy Manufacturing Co. has a new size of padded shipping bag; four by eight inches. Designed for shipping small objects such as machine accessories, jewelry, hardware, etc., it weighs less than one ounce. It uses kraft on the outside and has inside serrated edges. Circle No. 2.

Mixing, Dispensing Of Liquids

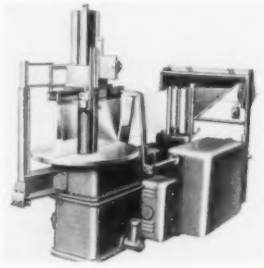
G. Diehl Mateer Co. announces a new horizontal metering pump for the proportioning, mixing and dispensing of two liquids in the same operation. There is an adjustable means of controlling the volume of a mixture — while maintaining the ratio or proportion of the two liquids delivered to the mixture.



A common drive serves both metering pumps. A dial controls the cycle and governs the volume of both pumps. Circle No. 3.

Flexible Packaging Machinery

Hudson-Sharp Machine Co. reports development of its new Campbell-pak, a machine that forms bags from roll



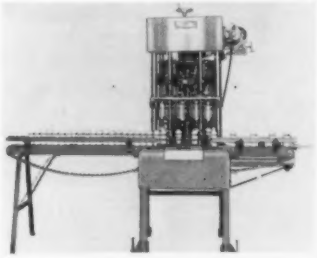
stock, holds and seals them — up to 40 units a minute, depending on filling equipment used. It handles bag sizes ranging from one by one to 14 by 20 inches. Film thicknesses may range up to six mil. This machine is designed for manual, semi- or fully automatic operation. Circle No. 4.

Moistureproof Plastic Film

Tee-Pak, Inc. is introducing a new moistureproof plastic film for food packaging. Called "Snug-Pak" the film shrinks to form a tight wrap conforming to the shape of the product. This shrinkage occurs when the packaged item is dipped momentarily in a hot water bath of 180 to 200 degrees F. Circle No. 5.

Liquid Filling Machine

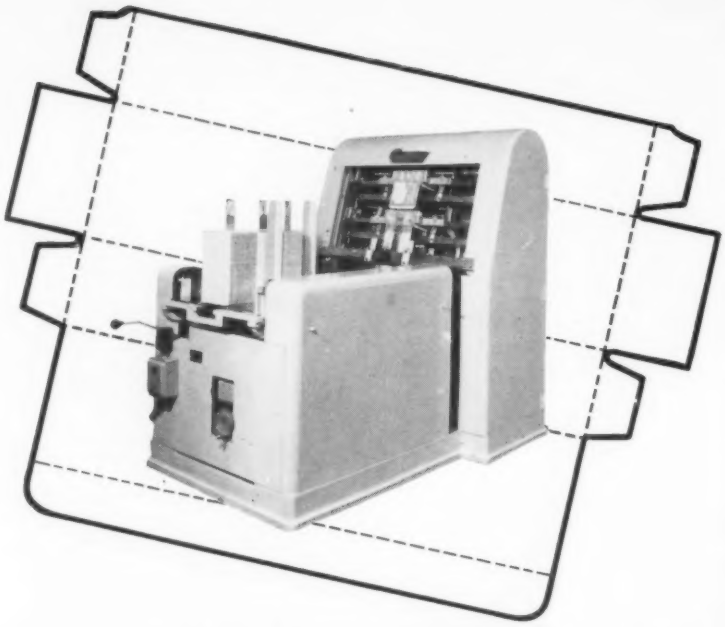
MRM Co. says that its new volumetric liquid filling machine is accurate in high speed filling to a tolerance of plus or



minus one gram. This machine has twelve spouts as well as a no-can, no-fill attachment. Operating speeds range from 60 to 100 containers a minute, according to MRM. Another special feature is ease of cleaning and sterilization. Circle No. 6.

Chemically Inert Film

Shamban Engineering Co. reports availability of "Califilm", also known as polytrifluorochlorethylene; fluorothene and Kel-F. Its application temperatures range from —120 degrees to more than 390 degrees F, according to Shamban, who announces that the film has nonwetting properties and resistance to fungus and hydraulic shock. Circle No. 7.



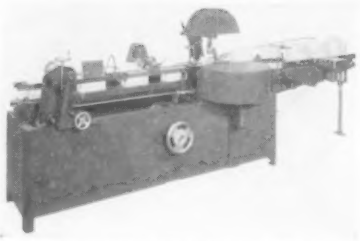
For profitable packaging ideas see Peters Equipment

. . . at Booth 740 in the National Packaging Exposition, April 9 - 12, at Atlantic City

Get engineering help and practical solutions to your packaging problems.

On display are the Peters Model SG Carton and Tray Forming and Gluing Machine — capable of speeds up to 175 or more per minute; the Model CCY-L Carton Folding and Closing Machine — that runs at speeds up to 120 or more per minute; and the Model L-2 Bag Sealing and Header Applying Machine — able to handle filled cellophane bags at speeds of 70 or more per minute.

For complete information and specifications on any of these machines, write, wire or call Peters. And be sure to drop in for a friendly chat at the packaging show.



Peters Model CCY-L Carton Folding and Closing Machine

Peters Model L-2 Bag Sealing and Header Applying Machine

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Peters MACHINERY COMPANY

4702 Ravenswood Avenue

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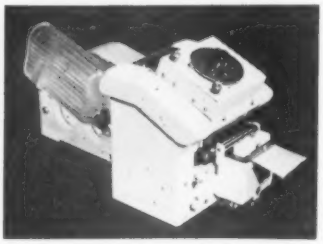
Taping Machinery

Marsh Stencil Machine Co. now produces its "Dial-Tapers" and "Twin-Tapers" in an all-white finish for use in



plants handling baked goods and other food products, as well as drugs and chemicals. These units are electrically-operated and provide dispensing of any lengths of tape, either dialed (with the "Dial-Taper") or preset, as with the "Twin-Taper" equipment. Circle No. 8.

Heat Sealing Equipment

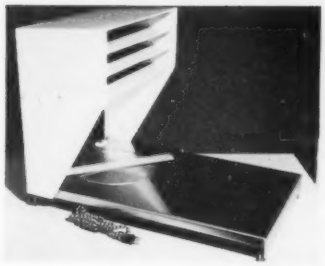
Vertrod Corp. announces its new impulse trim-sealing machine, a pneumatically powered unit. According to the company, the machine permits trim-sealing in lengths greater than 20 inches, making seals that separate and divide, thus making two completely sealed and trimmed edges without use of a knife. Circle No. 9.

Vapor Corrosion Inhibitor

Baird Chemical Corp. reports availability of "Akrode", an English made vapor pressure corrosion inhibitor. Among uses reported for this material are the prevention of corrosion of metal cans used for packaging latex paints, prevention of rusting of razor blades and preservation of machine parts for storage and shipment. Circle No. 10.

Domed Sealing Hotplate

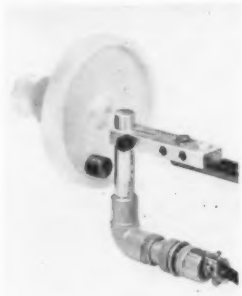
Cleveland Heat Sealing Equipment Mfg. Co. has a new domed hotplate for heat sealing film wraps, and re-



ports that use of a domed surface increases speed by 22 per cent — while the thin outer edge of the hotplate cuts down heat transfer to surrounding surfaces. The equipment uses ring-type Chromolox hotplate heating elements. Circle No. 11.

Magnetic Switch

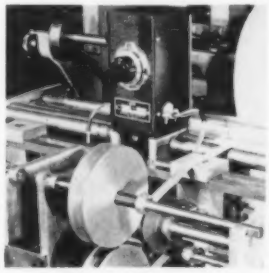
Post Machinery Co. announces its Model MH-2, a magnetically operated, high speed switch that is controlled by the



proximity of a magnetic field, as seen on wheel in photo. Switch arm transfers contact when magnet is near face of switch. This unit is a sensing device for actuating electrical and electronic circuits. Circle No. 12.

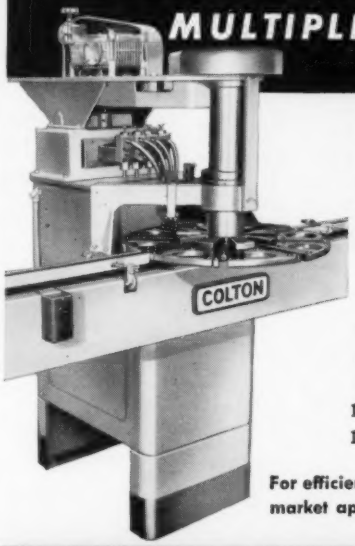
Roll-Leaf Coding Equipment

The Industrial Marking Equipment Co. announces a new automatic roll-leaf coding attachment for machinery de-



signed to form, fill and seal plastic packages automatically. The coding attachment may be adjusted to imprint a range of material, such as sizes, quantities, etc. Circle No. 13.

WORLD'S FASTEST, MOST ACCURATE, MOST VERSATILE MULTIPLE LIQUID FILLER



1. Up to 480 containers a minute
2. Accurate to less than 1%
3. Fills any liquid, alcohol to cream oil
4. Completely adjustable in *every* respect
5. Patented dripless suck-back, adjustable to viscosity
6. Nozzles adjustable for container height and width
7. Simple air bleeder
8. No container—no fill
9. Special adaptations available
10. Quick disassembly for sterilizing
11. Completely automatic

For efficiency, performance, economy, nothing on the market approaches this Colton No. 124-126-128-132.

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SHOWS HOW LUSTEROID SAVES MONEY IN SMALL ITEM PACKAGING

● New, helpful booklet shows why Lusteroid plastic vials and tubes are the economical and practical answer to your small item packaging and merchandising problems. Shows how Lusteroid's unique qualities provides complete protection for small items—eliminates the need for protective packing and partitioning—saves money in handling, packing and shipping. Illustrates how Lusteroid provides visible sales appeal for your product—permits free inspection—and turns shoppers into customers. Shows how Lusteroid eliminates labeling costs—cuts leakage and spoilage costs because of its unique "one-piece" construction—provides length flexibility at no extra charge. See how other products are packaged for safety, savings and sales in Lusteroid's low-cost plastic vials and tubes.

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3. Next, *fill in* your name and address.
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Packaging Machinery

Bartelt Engineering Co. has an illustrated folder describing its machinery and showing typical packages this equipment handles. This folder also has a sketch showing machine dimensions and includes basic operating details. Circle No. 101.

Using Corrugated Boxes

Hinde & Dauch offers a revised edition of its 20-page booklet, "How to ship more economically." This booklet discusses box details, loading patterns, and packing, sealing and shipping procedures. It also enumerates some case histories of packaging cost reductions attained in specific companies. Circle No. 102.

Filler And Capper

Anderson Bros. Mfg. Co. offers a bulletin describing its Model 341 filler and its Model 433 capper. It describes the basic features of this equipment, which handles round cups up to one-quart capacity — to package such products as ice cream, salad dressing, cottage cheese and other semi-solids. Circle No. 103.

Engineer's Check List

Riegel Paper Corp. has a packaging engineer's check list for the selection of flexible packaging materials. This list not only covers 21 points which a packaging engineer must check but also has an enumeration of simplified explanations of factors that arise in material selection. Circle No. 104.

Dry Labeling Details

New Jersey Machine Corp. offers a four-page folder that discusses the details of dry labeling and makes specific comparisons of it with glue labeling. Line drawings and charts augment the presentation. Circle No. 105.

Carton Filling, Sealing

J. L. Ferguson Co. has an illustrated folder reviewing its automatic fillers and top and bottom sealers for standard cartons and individual serving and sample packages. This folder includes machinery details, halftones of installations and drawings of equipment layout. Circle No. 106.

Automatic Capper

Anchor Hocking Glass Corp. has a bulletin announcing its 16-spindle rotary sealing machine for sealing 200 to 500 glass containers a minute. This folder lists machine specifications, describes its operation and includes halftones of the machine and the caps it handles. Circle No. 107.

Automatic Bottle Cleaner

U. S. Bottlers Machinery Co. offers an eight-page booklet describing details of its Sanitair automatic bottle cleaner. Halftones and line drawing accompany the text that reviews machine operation, container handling, automatic details, safety provisions — and the duplex-station feature. Circle No. 108.

Laminated Packaging Materials

Dobeckmun Co. has a sample folder containing actual printed samples of its Metalam, Durafilm and Paper Specialties materials. These are mounted on paper, punched for notebook use. Samples represent 19 different packages. Circle No. 109.

Heat Sealing Crimpers

Wrap-Ade Machine Co., Inc. offers a four-page folder describing its line of heat sealing crimpers. Illustrations include line drawings of six different sealing patterns that are available with this equipment. Circle No. 110.

Seamless Metal Cans

George D. Ellis & Sons, Inc. offers Bulletin No. 116 covering details of this company's seamless metal cans. This bulletin not only shows illustrations of the various cans but includes tabulations of their fluid ounce capacities, diameters and body heights, packing per carton and weight per gross. Circle No. 111.

Heat Measurement

The Pyrometer Instrument Co., Inc. announces its Catalog No. 168 which explains by text and illustrations the features of this company's line of pyrometers and heat measuring equipment, for both laboratory and production use. Circle No. 112.

Can Labeling

National Adhesives Division of National Starch Products has a 22-page booklet on can labeling This includes not only operational data but also a detailed tabulation and labeling difficulties, along with specific corrective recommendations. Circle No. 113.

An Unusual Publication

Phoenix Metal Cap Co. offers a current copy of its 30-year old Phoenix Flame, a publication that has items of interest to metal cap users, and includes an editorial content of literary and artistic material—published on the theory that business requires entertainment as well as factual data. Circle No. 114.

Equipment For Canning

Canning Machinery Co. has a bulletin

(Continued on Page 42)

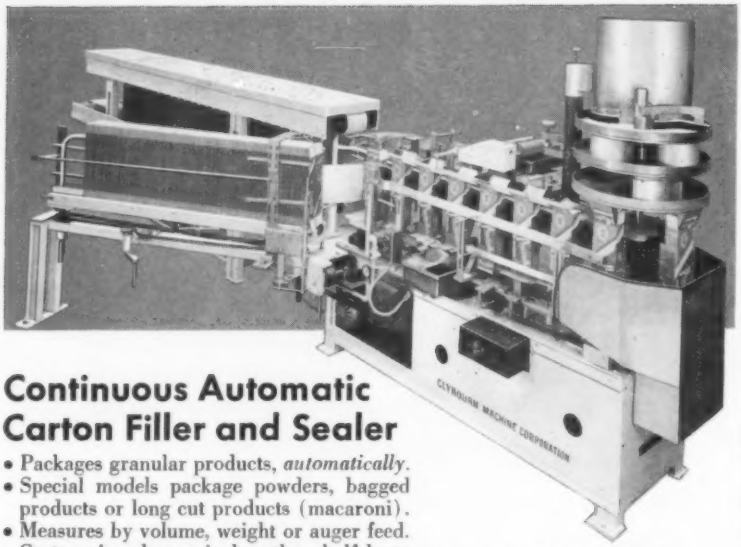
the *Creative Approach* for
containers that sell products

stone container
CORPORATION
4200 W. 42nd PLACE • CHICAGO 32, ILLINOIS

SALES OFFICES AND PLANTS
IN MOST PRINCIPAL CITIES

SUBSIDIARIES
W. C. RITCHIE AND COMPANY, CHICAGO, ILL.
WESTERN PAPER BOX CO., DETROIT, MICH.

Complete Packaging Service



Continuous Automatic Carton Filler and Sealer

- Packages granular products, *automatically*.
- Special models package powders, bagged products or long cut products (macaroni).
- Measures by volume, weight or auger feed.
- Carton size change in less than half hour even when 3 dimensions require change.
- Automatic shakedown assures proper pack.

Uses only 14'2" by 2'2" floor space. Smooth, continuous package flow for big volume, low cost output.

Send for Bulletin 20 or tell us what you want to package.

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WRAP-ADE high-speed UNIT PACKAGERS

WRAP-ADE Unit Packagers are versatile, low cost machines designed specifically for faster packaging with less waste. They perform an entire cycle of packaging operations including feeding, filling, forming and sealing practically every type of heat sealing materials.

UNIT PACKAGER with CONVEYOR FEED

For some packaging operations, this manually fed conveyor is the ideal feeding system. Among products adapted to this system are small textile products, flat food items, toys, bandages, or any other reasonably flat small product. *Other Unit Packagers available for almost any small item.*

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(Continued from Page 40)

containing specifications and drawings of its battery of can handling machinery, including details of "Walking-Beam" equipment — as well as the Bellamy "Labeleer" which Camco offers along with its own equipment. Circle No. 115.

Oscillating Conveyors

Link-Belt Co. offers Book 2478 reviewing its positive action oscillating conveyor. This booklet covers operating features equipment components and installation problems-solved, including line drawings and specifications. Circle No. 116.

Case Unloading Equipment

A-B-C Packaging Machine Corp. has a bulletin describing its case unloader and unscrambler, which operates automatically—requiring no operator. Halftones and line drawings show key features of this equipment. Circle No. 117.

Electronic Counters

Post Machinery Co. offers a file of sheets covering its electronic counters, photo-electric controls and electronic timers. These sheets are illustrated—and include specifications, as well as applications. Circle No. 118.

Polyethylene Tube Filling

Bradley Container Corp. has a folder describing procedures and equipment for filling its "Bracon" polyethylene tubes and squeeze bottles, including details of contract packaging provisions for these containers. Circle No. 119.

Unit Packaging Machinery

Conapac Corp. announces availability of a four-page bulletin describing its Roto-Wrap Model B, a continuous heat sealing, automatic packaging machine, including specifications and operating details. Circle No. 120.

Lightweight Nylon Fittings

Jaco Manufacturing Co. has a four-page folder describing its new lightweight nylon fittings which the company reports to be impervious to most acids and alkalies. This bulletin also lists applications and uses. Circle No. 121.

Inert Releasing Agent

Potdevin Machine Co. offers an illustrated folder describing its "Release-Cote", a releasing agent to prevent build-up of coatings such as glues, paints, inks, plastics and the like on pots, ink fountains and other exposed surfaces. Circle No. 122.

Transparent Packaging Data

Plastic Artisans, Inc. has an eight-page booklet reviewing details and features of its contoured-dome and product-contoured plastic packaging. This bulletin carries illustrations of typical packages and methods of assembling them. Circle No. 123.

Cushioning Details

The Celotex Corp. has a chart that shows how to design cushioning inner packs which are prefabricated to product contours. This bulletin tells how to design inner pack thickness and reviews properties of this company's "Neutral pH Board". Circle No. 124.

Polyvinyl Acetate Emulsions

Paisley Products Inc. offers a laboratory report on its polyvinyl acetate emulsions for such uses as water-resistant coatings. It reviews properties and processes applicable. Circle No. 125.

Case Sealing Equipment

Chisholm-Ryder Co. of Pennsylvania offers Bulletin No. 1498 describing its new case sealer. This folder contains halftones and explanatory data illustrating the special features of this equipment—and reviews detailed specifications. Circle No. 126.

Functional Packaging Materials

H. P. Smith Paper Co. has a brochure describing its custom processed barrier materials, including papers, foils, fabrics and films, as well as the properties and uses of these products, developed for protective packaging applications. Circle No. 127.

Variable Speed Transmissions

Lewellen Manufacturing Co. announces Catalog No. 65 which illustrates and describes this company's line of variable speed transmissions. It contains an engineering section covering power transmission characteristics, ratings and dimensions. Circle No. 128.

Resinproof Coatings

Federal Adhesives Corp. has a leaflet describing its resinproof coating for glue pots and other machine parts, to prevent clinging of glue and to facilitate machine clean-up. Circle No. 129.

(Continued on Page 47)

Hundreds of machines available that were designed for special industry applications.

Let us know your problem. We'll be happy to submit recommendation.

If your problem is high speed coating of paint, varnish, glue, latex, etc. — POTDEVIN'S sixty-three years of specialization in coating equipment can quickly help you solve it. *Illustrated is a special machine to uniformly paint wood up to 2 inches thick and 30 inches wide.*

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Designers and manufacturers of equipment for Bag Making, Printing, Coating, Laminating, Gluing and Labeling.

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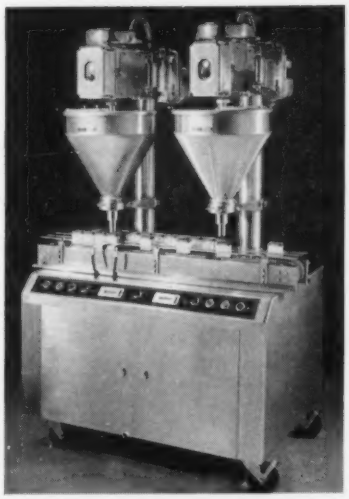
MATEER ELECTRIC FILLERS

FAST! ACCURATE! SANITARY! VERSATILE!



. . . with many plus features

If you asked a dozen different users of Mateer Electric Fillers which feature is the most important, the chances are they would report a different one. ***That's because Mateer Fillers are versatile and custom engineered to meet each customer's particular need.***

One user, when interviewed recently, said he was greatly impressed with the thorough consideration that Mateer gave to his product, and the many tests that were made before the final recommendations. But his experience wasn't at all unusual. We do this for each customer, which is why we so confidently guarantee satisfactory performance.

If you're interested in increased production, lower costs, or have an unusual filling problem, write for illustrated brochure "How modern is your filling equipment?" It's free.

G. DIEHL MATEER CO. Dept. P, Lincoln Highway, Stratford, Wayne, Pa.

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Packaging show exhibitors

(Continued from Page 35)

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Mark 'Andy, Inc.	1314
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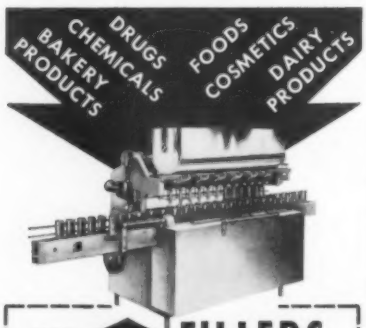

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Michigan State equipment drive still needs boost from industry

Student demand for Michigan State University's packaging courses have put such an overload on laboratory facilities that the need for expanding these has become critical. Anticipating all this, Dr. A. J. Panshin, head of MSU's forest products department, and James W. Goff, who teaches most of the packaging work, many months ago launched a drive for industry support, setting as their goal a fund of $40,000 — either in money or actual equipment.

Help From Budget

In spite of a hard-pressed university budget, school officials agreed to supply $10,000 if outside sources came up with the balance. At last count the donations of money and equipment came to $16,225, and the school has released its $10,000 to the packaging program. Now, the balance stands at $14,900 — so the need for further support from industry is evident.

Initially, the school set a February 1 deadline for the appearance of the total contributions from industry, but this deadline no longer applies. Noting that eleven companies have contributed to the packaging laboratory equipment fund, Mr. Goff says that MSU is grateful and encouraged: "The response has been very good and we have high hopes that we shall achieve our goal."

Students Crowd Lab

While the laboratory is the real point of overcrowding, the packaging classes themselves are crowded, and the need of additional physical space for the program is great. There are now 62 students in the "principles of packaging" course, and some 50 attend a course on the packaging of industrial items. The instructors have had to do a neat bit of scheduling and juggling to split the class into a dozen groups of four or five students each — for laboratory work, all at the same time and in a crowded area.

Underlying all this effort is the vital need of giving the packaging students adequate laboratory facilities. Without these, the highly technical packaging courses are reduced to lecture sessions — so the school is going all-out to win industry support. This is necessary because the university never has been able to provide sufficient funds for laboratory equipment.

Donors to the fund include Acme Steel Company; Robert Gair Company, Inc.; The Mennen Company; The Alcoa Foundation; W. R. Grace & Company; The Lord Baltimore Press; The Hinde & Dauch Foundation; Inland Container Corporation; Leeds Sales Company, Inc., and Jiffy Manufacturing Company. Their contributions aggregate $12,725. In addition, The Ohio Boxboard Company has donated a corrugated sample table, amounting to $3,500, making the total $16,225.

Much Equipment Needed

Most urgently needed items remaining on the MSU equipment fund list include the following:

Equipment	*Cost:*
Accessories for testing machine	$3,770
Folding endurance tester	970
Gurley-Hill SPS tester	600
Brightness & gloss meter	900
Concora single fluter	1,200
Laboratory abrasion set	650
Gas permeability cell	775
Score line tester	350
Folding carton die making equipment	1,000
Weatherometer	4,335
Tear test sample cutter	350
Total	$14,900

Donations Welcome

Michigan State welcomes donations of funds (in any amount) toward the purchase of this equipment, or donations of specific equipment items

themselves. Those wishing to contribute or those wishing more information should contact:

Dr. A. J. Panshin,
Head,
Department of Forest Products,
B-4 South Campus,
Michigan State University,
East Lansing, Michigan

Not only the specific packaging courses but various related courses (such as mathematics, engineering, et al) are geared closely to industry's needs. An advisory committee composed of men representing various segments of packaging meets regularly with the faculty — in order that the packaging courses not only meet MSU's academic standards but the specific needs of the packaging field as well. — R. B. H.

More industry literature available

(Continued from Page 43)

Hand Pack Filler

Food Machinery and Chemical Corp. offers a five-page technical data sheet reviewing the features of its hand pack filler which handles a range of products in cans or glass jars. Specifications of the machine are enumerated. Circle No. 130.

Case Packing Equipment

Burt Machine Co. has a four-page illustrated folder covering its "PCE" packer for the case-loading of labeled cans coming from the feed end of a labeling machine. Halftones show machine functioning. Circle No. 131.

Bag Packaging

Errich International Corp. offers an illustrated bulletin on its "Speedy Bag Packager", a machine developed to facilitate loading of bags with a variety of products. This bulletin shows machine functioning and products handled. Circle No. 132.

Reinforced Tapes

Angier Corp. has an illustrated folder that not only shows actual applications of its "Snake Tape" but also includes illustrations showing and tracing packers' motions in using such tape for center seam sealing. Circle No. 133.

Case Packing Equipment

W. F. & John Barnes Co. offers a four-page illustrated folder describing its case packer. Halftones and line drawings illustrate the operation of this equipment, including an enumeration of dimensions. Circle No. 134.

Packaging Large Items

Kennedy Car Liner and Bag Co. has a leaflet reviewing details of its facilities and materials for bags, liners, covers and shrouds for the packaging of large items, using papers, plastics and foils. Circle No. 135.

Packaging Machinery

Weigh Right Automatic Scale Co. offers its Catalog No. 55, a twelve-page booklet reviewing its line of machinery for packaging items ranging from a few milligrams to 25 pounds of dry materials. This catalog describes and illustrates filling, packing, weighing and other packaging equipment. Circle No. 136.

Variable Speed Equipment

Revco Inc. has a new catalog on its variable speed reducing equipment which not only describes and illustrates the equipment but contains suggestions such as how to measure torque. Line drawings accompany the discussion. Circle No. 137.

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What we think

The education of a packaging executive

Keeping up with current developments poses a hard problem to the man responsible for a company's technical and operational packaging. Kaleidescopic changes in the technique of the day's work demand such close attention that little time remains for development as a broad gauge executive.

This focusing of thought and action, however vital to the job at hand, is unfortunate: It deters a man from turning his attention to the task of *managing* the packaging function, a subject that is becoming increasingly important. Whether he realizes it or not, the packaging expert now has a three-sided task:

1. Making best use of packaging methods and materials.
2. Controlling the economics of packaging, not merely by doing the job well, but at lowest cost.
3. Using the tools of management to develop and utilize effectively the structural and functional organization and relationships necessary to attain these ends.

Need Balanced Development

All this is no secret to many packaging specialists. They know too well what is necessary. They are keenly aware that a man needs know-how above and beyond that of his own job, his own department—and his own company. They have learned that he needs more than just know-how; he needs a breadth of view, a seasoning of judgment, a certain well-roundedness of background.

The real obstacle to this full development as a packaging executive is the difficulty of getting away physically and mentally from one's own job in order to get a perspective on things. But to those who (with whatever ease or difficulty) do get away once in a while, the dividends are large. Visiting other plants, attending the meetings of industry and professional groups, trading experiences with others doing like work—all these are vital to growth and development on the job.

American Management Association's 25th Anniversary National Packaging Conference offers a singular opportunity to packaging specialists and executives because it is designed to meet the very needs we have just enumerated. We suggest this conference as a "must" on any packaging man's calendar for April 9-11, 1956, at Atlantic City.

Besides furnishing know-how and ideas from speakers of recognized competence, the conference emphasizes the broader attributes and needs of a packaging executive. Through the various presentations run the underlying themes of technique, efficiency, profit-consciousness, and managerial integration—all contributing to the "whole" packaging man.

Planned By Men Who Know

This emphasis on broad concepts as well as the latest technology of the field is consistent with the feeling of AMA that the importance of managing the packaging function is now overriding. The program of the conference is a reflection not only of the able leadership of AMA's packaging division but also of the competent guidance furnished by members of the division's packaging council—men who know what it takes to develop and direct a packaging program in its technical and operational details.

Those who can attend this conference should do so. But they should do more than just sit through the sessions and absorb the material. This annual getting-together affords an incomparable opportunity for discussion, questioning, sharing of experiences and problems, and comradeship with others in the same field. Those who make the most of all this will be glad they did. Those who don't will wish they had.

Bruce Holmgren

Editor

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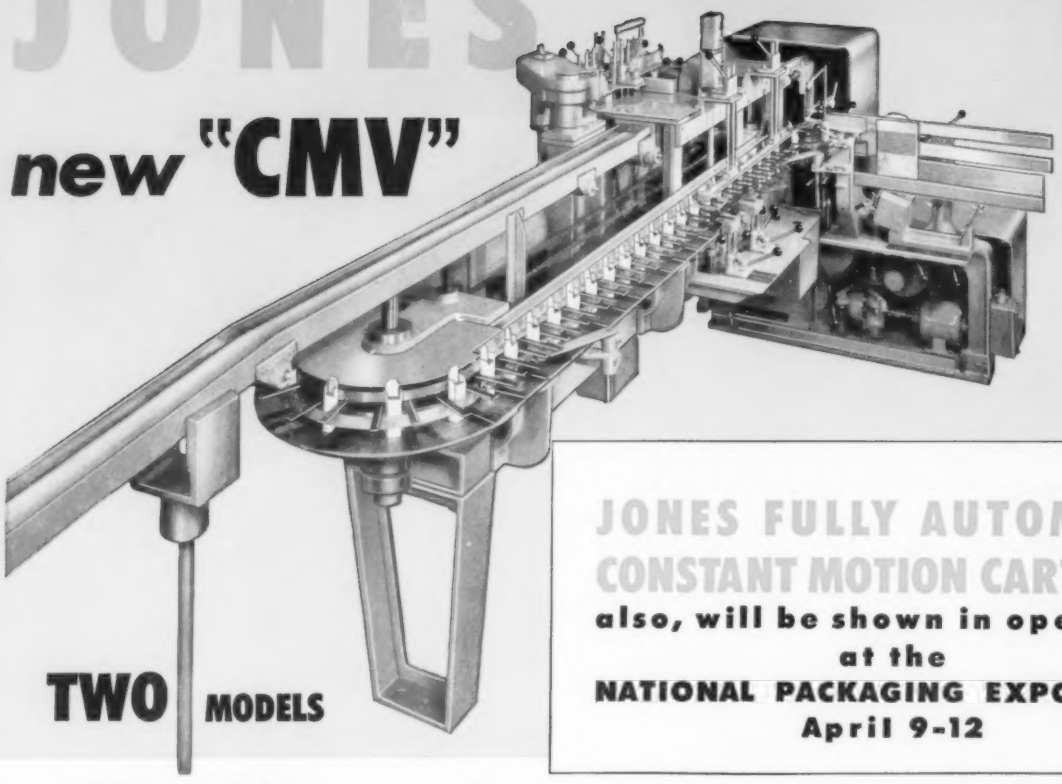

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